Technical
Instructions

IDC DOCUMENTATION

Event Screening Subsystem Software User Manual

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Notice

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About this Document

This chapter describes the organization and content of the document and includes the following topics:

About this Document

PURPOSE

This document describes how to use the Event Screening Subsystem (ESS) software of the International Data Centre (IDC). The software is a computer software component (CSC) of the Automatic Processing computer software configuration item (CSCI) and is identified as follows:

Title:	Event Screening Subsystem
Abbreviation:	ESS

SCOPE

This manual includes instructions for setting up the software, using its features, and basic troubleshooting. This document does not describe the software's design or requirements.

AUDIENCE

This document is intended for the first-time or occasional user of the software. However, more experienced users may find certain sections useful as a reference.

RELATED INFORMATION

The following documents complement this document:

- *Formats and Protocols for Messages* [IDC3.4.1Rev2]
- *Database Schema* [IDC5.1.1Rev2]
- *IDC Processing of Seismic, Hydroacoustic, and Infrasonic Data* [IDC5.2.1]

See "References" on page 81 for a list of documents that supplement this document. The following UNIX manual (man) pages apply to the existing ESS software:

- *evsc_drv*
- *go_evsc*
- *libevsc*

USING THIS DOCUMENT

This document is part of the overall documentation architecture for the IDC. It is part of the Technical Instructions category, which provides guidance for installing, operating, and maintaining the IDC systems. This document is organized as follows:

- Chapter 1: Introduction

  This chapter provides an overview of the software's capabilities, development, and operating environment.
- Chapter 2: Operational Procedures

  This chapter describes how to use the software and includes detailed procedures for startup and shutdown, basic and advanced features, security, and maintenance.
- Chapter 3: Troubleshooting

  This chapter describes how to identify and correct common problems related to the software.
- Chapter 4: Installation Procedures

  This chapter describes first how to prepare for installing the software, then how to install the executable files, configuration data files, database elements, and Tuxedo files. It also describes how to initiate operation and how to validate the installation.
- References

  This section lists the sources cited in this document.

- Glossary

  This section defines the terms, abbreviations, and acronyms used in this document.

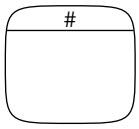
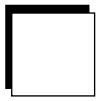
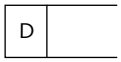
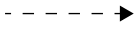
- Index

  This section lists topics and features provided in this document along with page numbers for reference.

Conventions

This document uses a variety of conventions, which are described in the following tables. Table I shows the conventions for data flow diagrams. Table II lists typographical conventions.

TABLE I: DATA FLOW SYMBOLS

Description	Symbol[1]
process	
external source or sink of data	
data store D = disk store Db = database store	
control flow	
data flow	

1. Most symbols in this table are based on Gane-Sarson conventions [Gan79].

TABLE II: TYPOGRAPHICAL CONVENTIONS

Element	Font	Example
database table	**bold**	**evsc_prod**
database table and attribute when written in the dot notation		**evsc_prod.***score*
database attributes	*italics*	*score*
processes, software units, and libraries		*libevsc*
user-defined arguments and variables used in parameter (par) files or program command lines		`delete-remarks` *object*
titles of documents		*Database Schema*
computer code and output	`courier`	`URL not Found - Error 404`
filenames, directories, and websites		`$EVSC_WEB/runs`
text that should be typed exactly as shown		`du $EVSC_WEB/runs`

Chapter 1: Introduction

This chapter provides a general description of the software and includes the following topics:

Chapter 1: Introduction

SOFTWARE OVERVIEW

Figure 1 shows the logical organization of the IDC software. The ESS is a CSC of the Automatic Processing CSCI. In addition to automatic processing of the standard and subscription event-screening criteria, the ESS can be invoked in interactive modes for custom event-screening requests via *AutoDRM* and the Web Subsystem, as described in "Features and Capabilities" on page 6.

Figure 2 shows the processing flow of the IDC system and the relationship of the ESS to other components of the system.

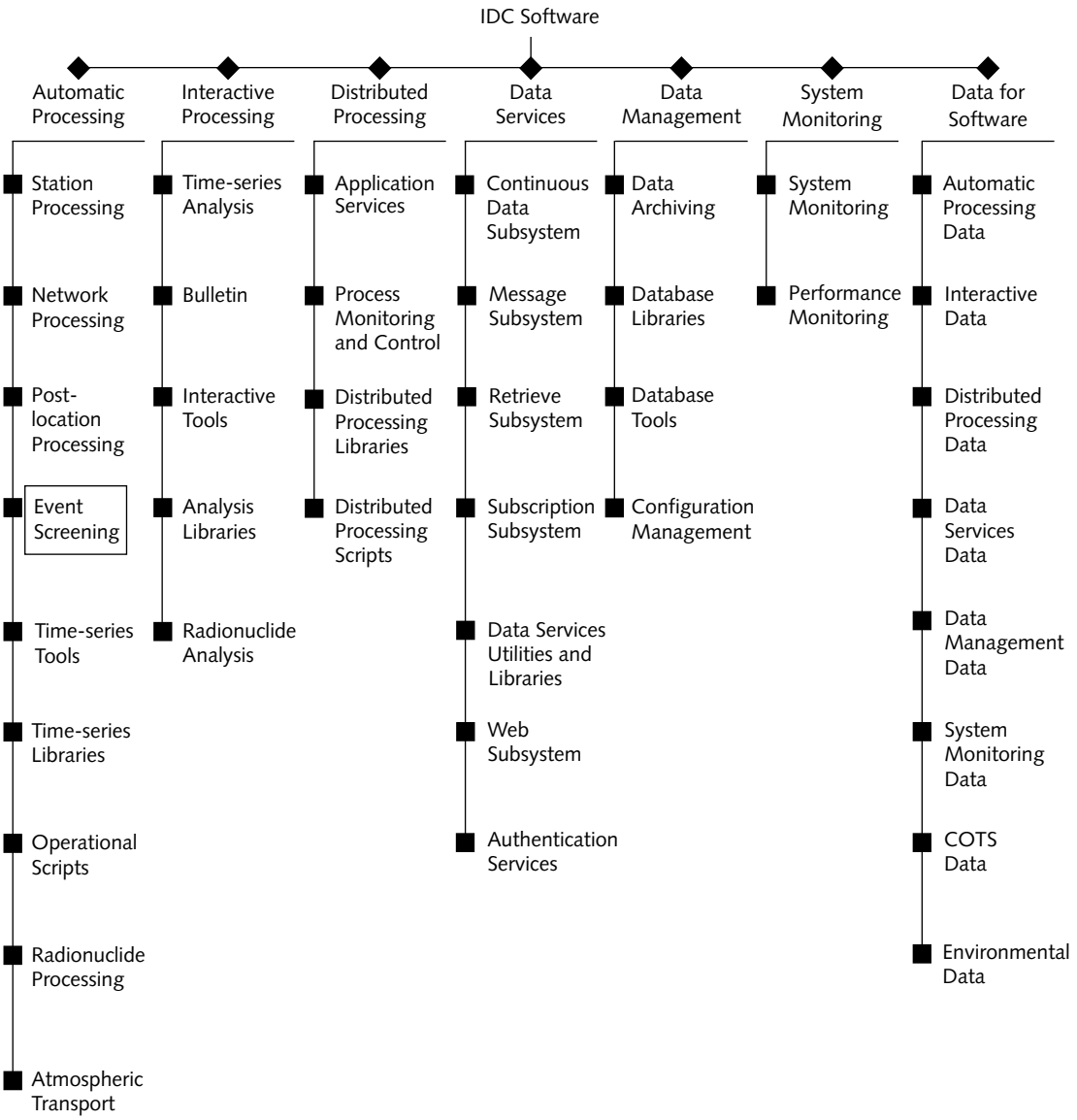


FIGURE 1. IDC SOFTWARE CONFIGURATION HIERARCHY

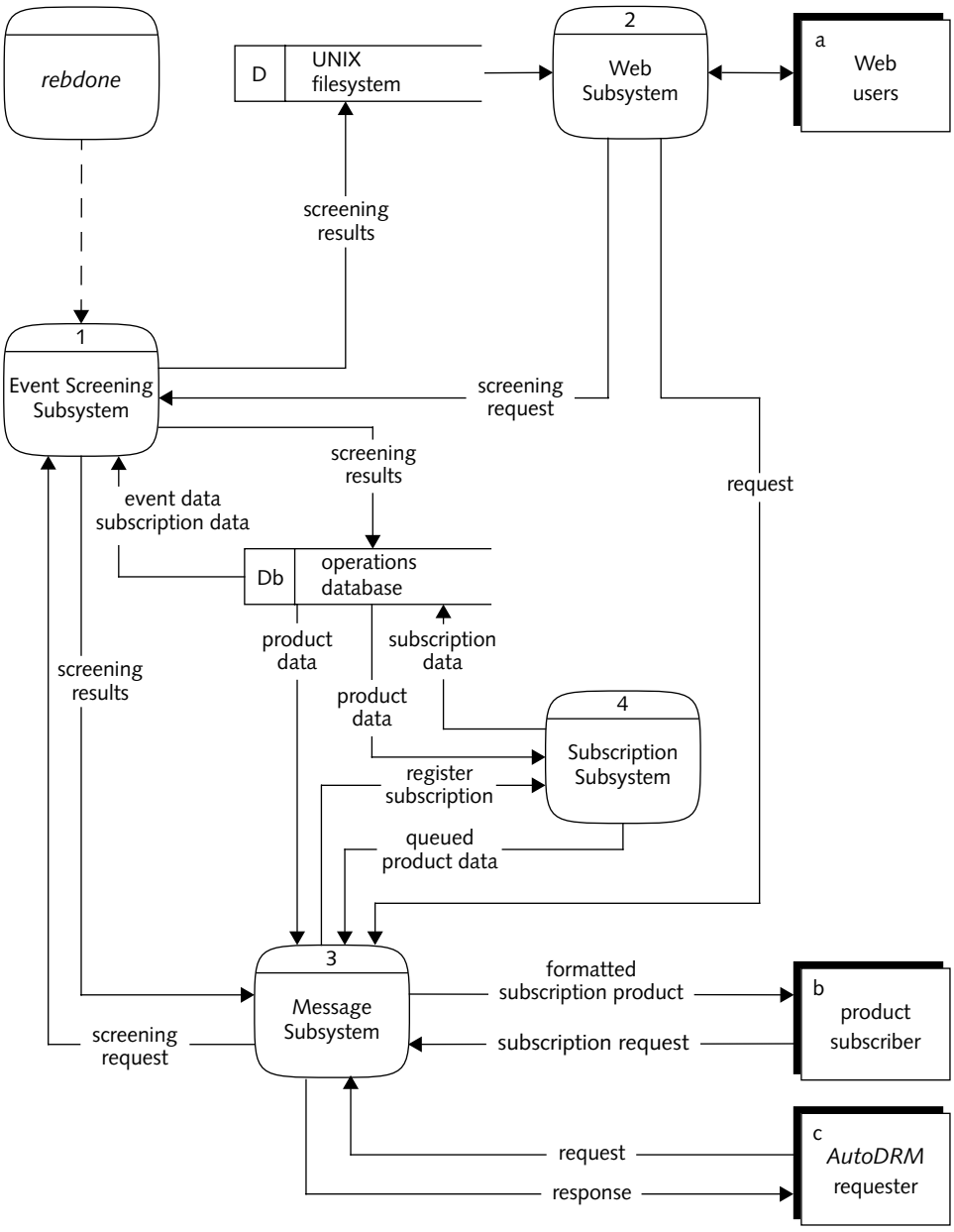


FIGURE 2. IDC PROCESSING FLOW OF ESS AND DATA EXPORT SUBSYSTEMS

FUNCTIONALITY

The ESS applies standard and national (custom) event-screening criteria to screen out (exclude) events that are consistent with natural phenomena, based on seismic and hydroacoustic data. The provisional event-screening criteria are based on event depth, the difference of surface- and body-wave magnitudes (denoted Ms:mb), regional seismic P/S amplitude ratios, and hydroacoustic signal characteristics for events in relatively deep ocean regions. Scores are computed to indicate numerically for each event the degree to which that event does, or does not, meet the individual event-screening criteria. A combined score is also computed.

The ESS applies the standard event-screening criteria (see "Seismic-acoustic Event-screening Procedure" on page 14) and produces a formatted block of parametric results (called the EVENT SCREENING block) for inclusion in the Standard Event Bulletin (SEB) and the Standard Screened Event Bulletin (SSEB). The content and format of the SSEB are the same as for the SEB [IDC3.4.1Rev2], except that events that are screened out are not included in the SSEB. The ESS also computes the numbers of events in the SEB and in the various event-screening categories (see Table 1 on page 19) for inclusion in the Executive Summary. Web-based versions of these products include graphical displays of the screening results.

The ESS is integrated with all IDC data export subsystems, including the Web, Message, and Subscription Subsystems. These interfaces allow Signatories to access the SEB, SSEB, and Executive Summary, and to apply national event-screening criteria to produce a National Event Bulletin (NEB), a National Screened Event Bulletin (NSEB), and a National Executive Summary, with the same respective formats, but with alternate event-screening criteria applied.

The main software components of the ESS are listed below. Additional scripts and data files are also provided to execute the ESS and generate graphics for Web processing, as described in "Web Processing" on page 22.

evsc_drv	main event-screening program
go_evsc	*Perl* script for automatic processing to set appropriate environments and invoke the *evsc_drv* executable
libevsc	library of event-screening functions

The ESS is invoked in three ways: (1) by an automatic process that generates the standard and subscription results, (2) by the Web user interface, and (3) by the Message Subsystem for product requests involving event screening. The library *libevsc* is used in each of these calling methods, accepting similar inputs from the calling processes.

Features and Capabilities

The ESS operates in automatic and interactive modes. In automatic mode, the standard and subscription screening criteria are applied to relevant events in the SEB (namely, those that meet event-selection criteria based on location, magnitude, and other event parameters for a given subscription) on a particular day. Each set of input data is specified by a row in the **producttypeevsc** and **producttypeorigin** tables with a unique product identifier. Additional input data for automatic processing are stored in the **attencoef** and **regcoef** tables. Screening results are written to the **evsc_prod**, **evsc_hydro**, and **evsc_regional** tables for later retrieval by *AutoDRM* or Web processing. Automatic processing is not under the user's control; however, the user may define inputs for national event-screening criteria. In interactive mode, a user may specify custom screening criteria via the *AutoDRM* and Web interfaces to obtain custom products that are stored on the file system.

The operations database (Db in Figure 2 on page 4) stores all subscription criteria, event parameter data, and standard and subscription screening results. The UNIX filesystem (D) contains the Web output directory that stores Web-based versions of the standard screening products and those generated by custom screening requests via the Web user interface. Products can be generated/accessed by Web users (a), product subscribers (b), and *AutoDRM* requesters (c) through the Message or Web Subsystems. The Message Subsystem supports requests and subscriptions of standard or custom products. The Message and Subscription Subsystems handle all logging, processing, formatting, and dissemination of IDC data products via email (see [IDC7.4.2] and [IDC7.4.4]). The Web Subsystem provides access to the standard products and custom screening criteria to be specified to generate national screening data products. The Web also has an interface to the Message

Subsystem as a mechanism for users to submit requests and establish subscriptions. Specific processing and data flow for the various operational modes are described in the following sections.

Automatic Processing

The fundamental operating mode of the ESS applies automatic standard and subscription event-screening criteria after post-Reviewed Event Bulletin (REB) processing of event-characterization parameters has completed. Figure 3 shows the automatic processing flow. Processing is initiated by *tuxshell* as part of *rebdone*. The *rebdone* script executes a Perl script, *go_evsc*, that calls *evsc_drv* with the proper command arguments. The standard screening and subscription criteria are extracted from the **producttypeevsc** and **producttypeorigin** tables. Event characterization data used by *evsc_drv* are extracted from the **origin**, **origerr**, **netmag**, **assoc**, **arrival**, **parrival**, **amplitude**, and **hydro_features** tables in the REB account. The **dataready** and **lastid** tables also are read to determine whether or not the data are ready to be processed. At the completion of the processing by *evsc_drv*, the results are written to the **evsc_prod**, **evsc_hydro**, and **evsc_regional** tables. Entries are appended to the **dataready** and **lastid** tables to indicate that the screening results have been processed. All of these tables are in the operations database (Db).

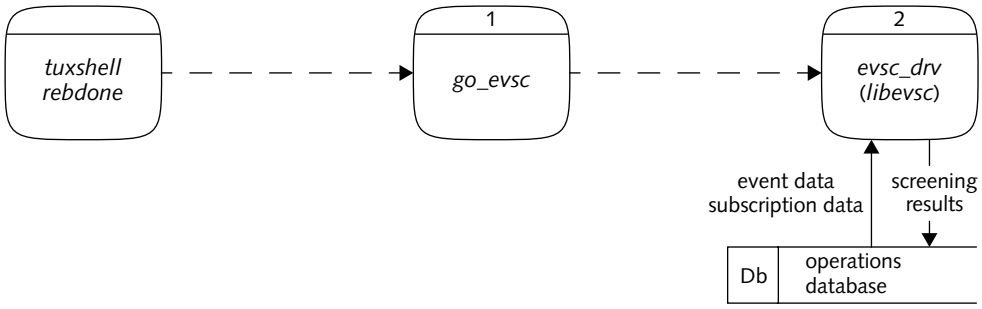


FIGURE 3. AUTOMATIC PROCESSING FLOW

A daily *cron* job executes a Perl script, *go_batch_daily.pl*, that calls *clean.pl* to remove old content from the `$EVSC_WEB/runs` directory and calls *hist_update.pl* to add data to the monthly/yearly plots of screening performance summaries.

Web Standard Requests

Figure 4 shows the processing flow for accessing the standard products via the Web Subsystem. Standard products are accessed by the Web users (a) by clicking on the "Products" link on the IDC home page (examples of the products and instructions for Web users to access them are provided in "Basic Procedures" on page 40.) Common Gateway Interface (CGI)/Perl scripts display pre-computed results from the `$EVSC_WEB/runs` directory (D). The screening code is executed to extract the results from the **evsc_prod**, **evsc_hydro**, and **evsc_regional** tables (Db) and to write them to the filesystem. The Perl script, *go_top.pl*, is called to handle the user request. This script generates the standard Executive Summary, SEB, SSEB, and associated graphics for the particular day. One to five minutes are needed to complete the processing and write the files to disk. If the files already exist, the processing is not repeated, and the time needed is shorter.

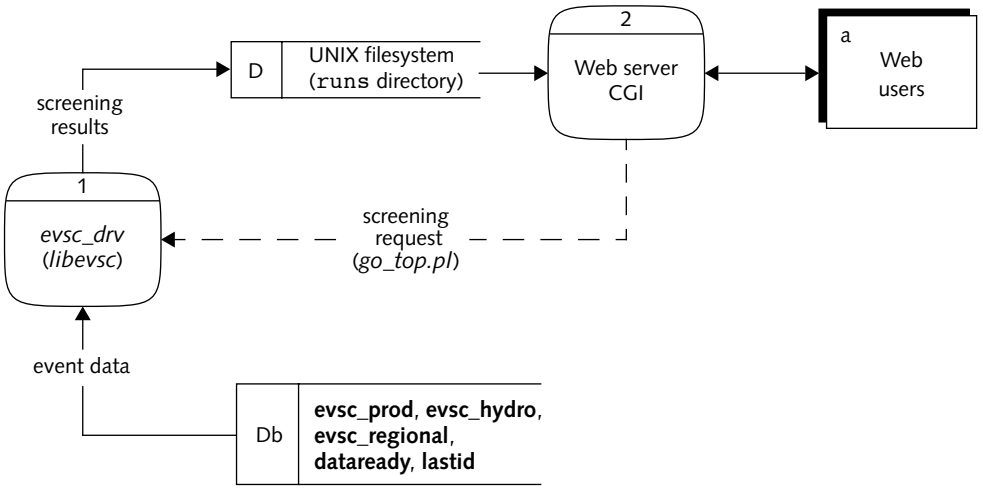


FIGURE 4. PROCESSING FLOW FOR WEB STANDARD REQUEST

Web Custom Requests

Figure 5 shows the processing flow for a custom event-screening request via the Web. Such requests are made by Web users (a) through the Custom Event Screening Form (see Figure 12 on page 45). The form is generated by the Perl script, *form_all.pl*. The "Submit Run" button on this form executes the *go_form.pl* script, which calls and passes the specified custom screening criteria to *evsc_drv* via the Web server CGI. (Detailed instructions for Web users to access and use this form are provided in "Basic Procedures" on page 40.) Results are computed on demand using event data from the **origin**, **origerr**, **netmag**, **assoc**, **arrival**, **parrival**, **amplitude**, and **hydro_features** tables in the operations database (Db). The resulting products and graphics are written to the `$EVSC_WEB/runs` directory of the filesystem (D). The Web server CGI interface is used to view these custom products after they are produced.

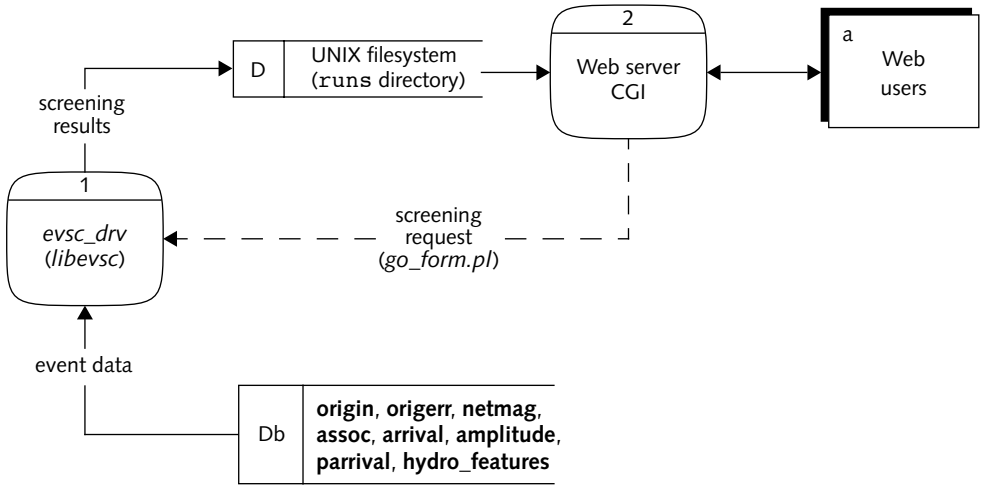


FIGURE 5. PROCESSING FLOW FOR WEB CUSTOM REQUEST

AutoDRM Standard Requests

Figure 6 shows requests of the SEB and SSEB via *AutoDRM*. *AutoDRM* requests are made by email to the Message Subsystem. Alternatively, the requester (c) may use the Web interface to *AutoDRM* to submit the request to the Message Subsystem. The ESS is integrated with the existing parameterized data export methods (*AutoDRM* and the Subscription Subsystem) by calling the function *get_evscsum* in *libevsc* from the function *idc_bulletin* in *libgsefmt* that generates the bulletin. If the requested bulletin is either the SEB or SSEB, then *idc_bulletin* sends a list of origin identifiers (*orid*s) to *get_evscsum*, which reads the results from the **evsc_prod**, **evsc_hydro**, and **evsc_regional** tables and returns the parametric screening results to *idc_bulletin*, formatted as the EVENT SCREENING block of the bulletin. In addition, *idc_bulletin* does not print the SSEB for events that are screened out, which is the only difference between the SEB and SSEB. The requested bulletin then is sent through the Message Subsystem to the requester.

AutoDRM Custom Requests

Figure 7 shows the data flow for an *AutoDRM* request involving custom screening criteria. A custom screening request may be made by the *AutoDRM* requester (c) by email to the Message Subsystem or by using the Web interface to the Message Subsystem. The request criteria and a list of *orid*s are provided to *get_evscsum* of *libevsc* from *idc_bulletin* of *libgsefmt*. Custom screening results are processed on demand using event parameter data extracted from the **origin**, **origerr**, **netmag**, **assoc**, **parrival**, **amplitude**, and **arrival** tables of the operations database (Db). The parametric screening results are returned by *get_evscsum* to *idc_bulletin* and are formatted as the EVENT SCREENING block of the requested bulletin (either NEB or NSEB). In addition, *idc_bulletin* does not print the NSEB for events that are screened out. The requested bulletin is then sent through the Message Subsystem to the requester.

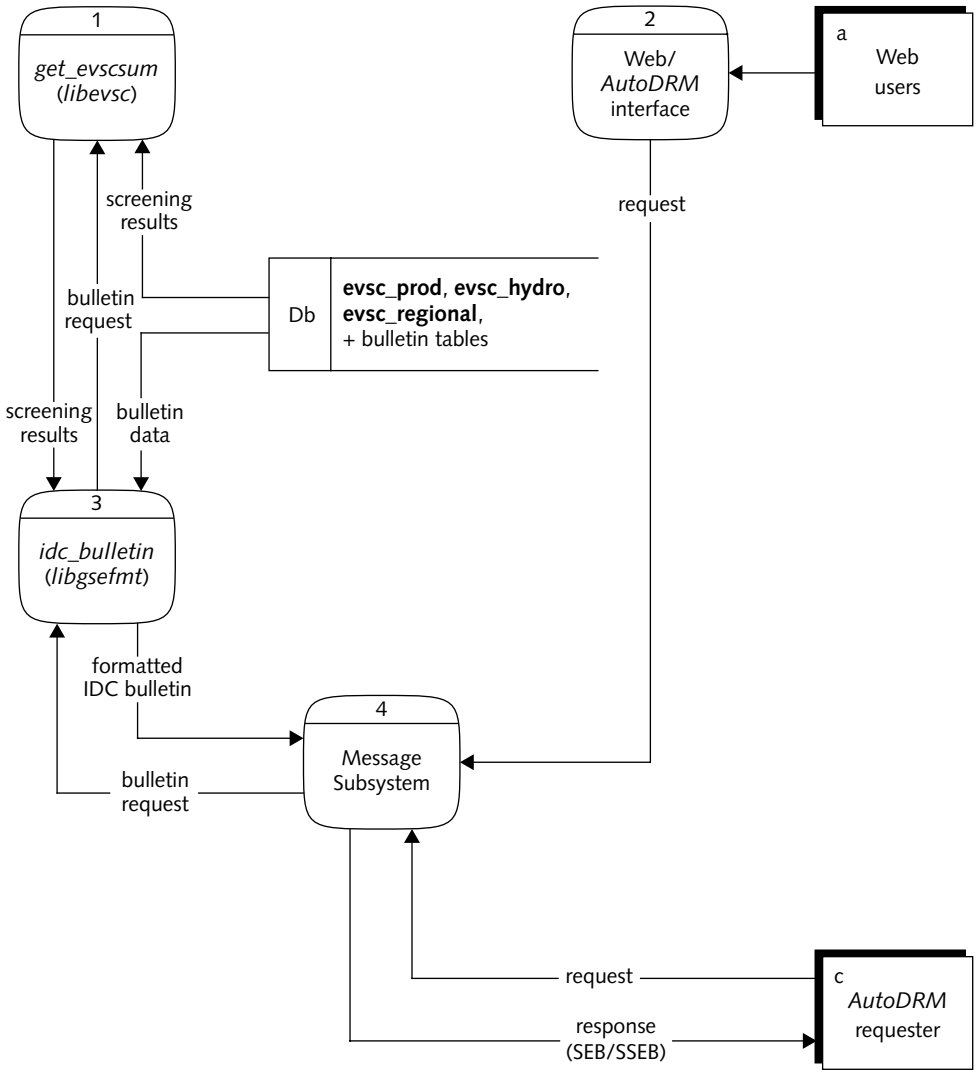


FIGURE 6. PROCESSING FLOW FOR AUTODRM STANDARD REQUEST

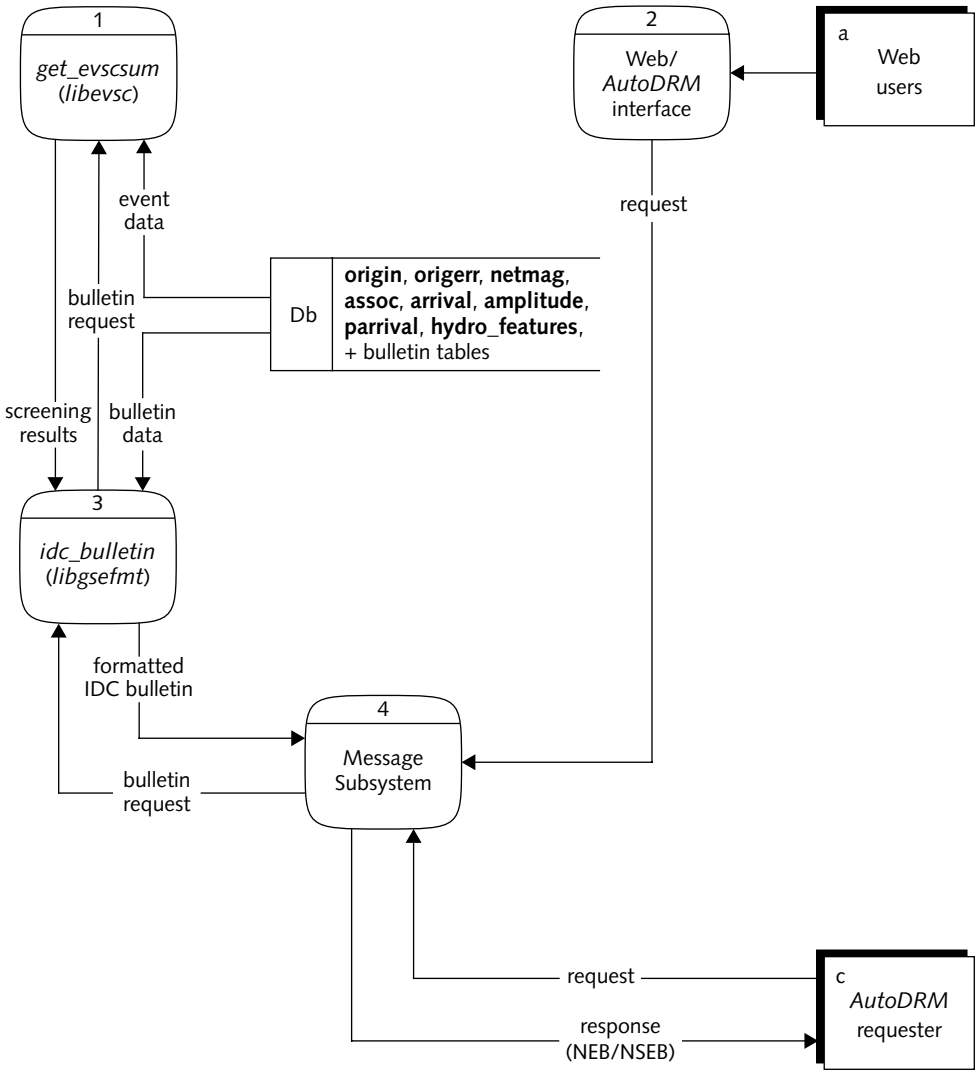


FIGURE 7. PROCESSING FLOW FOR AUTODRM CUSTOM REQUEST

Subscriptions

The Subscription Subsystem supports subscriptions to the SEB, SSEB, Executive Summary, and national versions of these products. Figure 8 shows the processing flow for establishing and exporting subscription products. A subscription is

established by the subscriber (b) by email or through the Web interface to the Message Subsystem, which registers the subscription through the Subscription Subsystem. The interface of the ESS to the Subscription Subsystem is through the **dataready** table in the operations database (Db). When automatic processing of the event-screening results is finished, a row is inserted into the **dataready** table, informing the Subscription Subsystem that the SEB and SSEB products are available. The products are processed using the procedures outlined in *Subscription Subsystem* [IDC7.4.4]. The final step in processing the subscription is generating the product. The program *SubsProcess* starts *AutoDRM* as a child process. *AutoDRM* accesses the pre-computed screening results, generates the properly formatted bulletin, and arranges for product delivery.

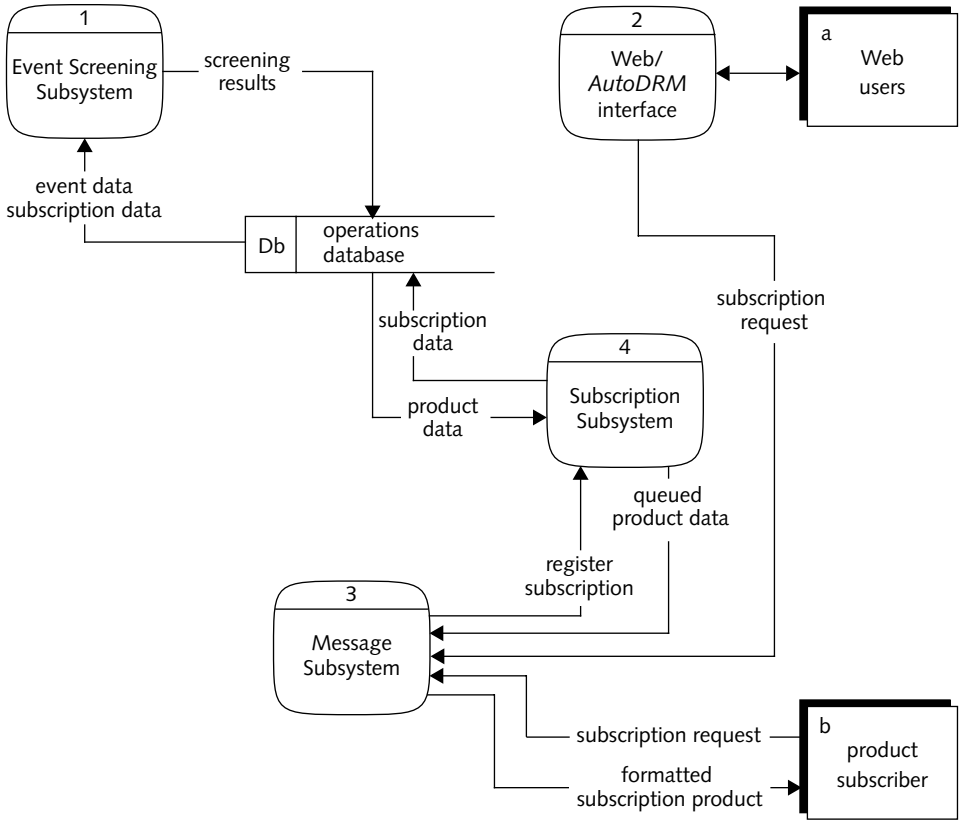


FIGURE 8. PROCESSING FLOW FOR SUBSCRIPTIONS

Seismic-acoustic Event-screening Procedure

The standard event-screening procedures and criteria are based on the *Report of the International Data Centre Technical Experts Meeting on Seismic-Acoustic Event Screening* [WGB01]. The screening criteria are based on seismic depth estimates, the difference of body and surface wave magnitudes (Ms:mb), regional seismic P/S amplitude ratios, and hydroacoustic high-frequency energy measures and cepstral features (to indicate the presence/absence of a bubble pulse) for offshore events. The following sections define the standard event-screening procedures, criteria, scores, and categories. The explicit values of the criteria presented below correspond to the standard event-screening procedure. These values may be modified for natural or custom screening requests and subscriptions. See [IDC5.2.1] for descriptions of how the event characterization parameters are computed.

Depth Screening

Let *D* be the depth estimate (**origin**.*depth*), and let s_{zz} be the variance of the depth estimate (**origerr**.*szz*) in the REB. An event is screened out based on depth if condition (1) is true:

$$D - 2\sigma_D > 10 \text{ km} \quad (1)$$

where

$$2\sigma_D = 2\sqrt{s_{zz}} + k \quad (2)$$

The default value of *k* is 20 km for free-depth solutions, to treat model errors that are not adequately represented by s_{zz}. The value of *k* is 0 km for depth-phase solutions.

The depth screening criterion in (1) is applied to depth-phase solutions only if the following conditions are satisfied:

- Three depth phases of the same type (pP or sP) are observed.
- The signal-to-noise ratios (snr) of the depth phases are at least 2.0 based on peak-to-trough amplitude measurements.

- The moveout of pP–P travel times is at least 1.5 s and/or the moveout of sP–P travel times is at least 1.3 s for stations in the distance range of 25 to 100 degrees.
- The travel time difference, t(pP–P), is at least 12.9 s and/or t(sP–P) is at least 19.0 s at the nearest station beyond 25 degrees.

The depth-screening score is defined in (3).

$$SCORE_{Depth} \equiv \frac{D - 10\ km}{2\sigma_D} - 1 \tag{3}$$

Ms:mb Screening

Let m_b and M_s denote the network-average body and surface-wave-magnitude estimates from N_b and N_s stations, respectively, in the REB. An event is screened out if condition (4) is satisfied.

$$1.25 \cdot m_b - M_s + 2\sigma_M < 2.20 \tag{4}$$

where

$$\sigma_M^{\ 2} = 1.25^2 \frac{\sigma_b^{\ 2}}{N_b} + \frac{\sigma_s^{\ 2}}{N_s} \tag{5}$$

$\sigma_b = 0.34$ and $\sigma_s = 0.23$ are standard deviations for single-station m_b and M_s estimates, respectively.

The Ms:mb screening score is defined by (6).

$$SCORE_{Msmb} \equiv \frac{2.20 - (1.25 \cdot m_b - M_s)}{2\sigma_M} - 1 \tag{6}$$

Regional P/S

The regional P/S screening criterion is defined as a hypothesis test with a fixed significance level with respect to incorrectly screening out an explosion. The test uses measurements of Pn/Sn and Pn/Lg amplitude ratios in the 6–8 Hz band. These

measurements are extracted from the **amplitude.***amp* field, where **amplitude.***amptype* is one of `noiLg`, `noiPn`, `noiSn`, `sigLg`, `sigPn`, or `sigSn`, and **amplitude.***chan* is `rms6-8` for a given station. The amplitude ratios are first corrected for distance-dependent attenuation, which is modeled by (7):

$$\log(P/S) = a + b \cdot \log\Delta + c \cdot \Delta \tag{7}$$

where Δ is the event-to-station distance, and the coefficients a, b, and c are calculated for tectonic and stable regions and are stored in the **attencoef** table. The distance-corrected P/S amplitude ratios are corrected for station- and region-specific variations using a Bayesian calibration technique with a spatial correlation length of 6 degrees and residual and calibration variances of 0.25. The values of the correction and variance at a point S_0 are denoted by $\hat{u}(S_0)$ and $\sigma^2(S_0)$, respectively.

Let $\log[Pn/Smax(6–8\ Hz)]_{cor}$ denote the distance-corrected value of log[Pn/Smax] in the 6-8 Hz band, where Smax is the maximum of the Sn or Lg amplitude. Define $x = \log[Pn/Smax(6–8\ Hz)]_{cor} - \hat{u}(S_0)$, and let λ be defined by (8).

$$\lambda = \frac{x - \mu_{EX}}{\sqrt{\sigma^2 + \sigma^2_{r,EX}}} \tag{8}$$

where $\mu_{EX} = 0.81$ and $\sigma_{r,EX} = 0.22$ are the estimated mean and residual standard deviation, respectively, of x for the explosion population.

The screening criterion sets the probability of screening out an explosion to be α. An event is screened out if $\lambda < z_\alpha$, where z_α is the (1–α)-percentile of the standard normal distribution with zero mean and unit variance. For the default significance level of $\alpha = 0.005$, $z_\alpha = 2.576$.

The regional P/S screening score is defined by (9).

$$SCORE_{Regional} \equiv -\lambda/z_\alpha - 1 \tag{9}$$

The regional P/S screening scores are computed for events in the SEB with m_b greater than or equal to 3.5, regional recordings in the distance range of 3 to 17 degrees, Pn snr > 2, and S snr > 1.3.

Hydroacoustic Screening

Seismic events that are confidently offshore, in ocean water depths for which it is not feasible to emplace and test explosions in sub-oceanic material and with no hydroacoustic high-frequency energy (for example, above 32 Hz) nor evidence of a bubble pulse, are very likely to be natural phenomena or small man-made signals that are not of interest. Hydroacoustic processing capabilities include measurements of energy levels and cepstral parameters (to indicate the presence of a bubble pulse), defined briefly in the following paragraphs. For details regarding these and other hydroacoustic measurements, refer to [IDC5.2.1] and [IDC7.1.1].

SEB event locations are used to predict a hydroacoustic arrival-time window. A running short-term average energy, STA, is computed over the predicted arrival time interval, after filtering the signal in two frequency bands. The default time window (in the *DFX* par file) of the running STA is 10 seconds. The default high-frequency band (band7, defined in the *DFX* par file) is 32-64 Hz for all hydrophones with a Nyquist frequency above 64 Hz and 32-48 Hz for existing hydrophones with a Nyquist frequency below 64 Hz. A running long-term average energy, LTA, is computed to estimate the noise level.

Hydroacoustic arrival amplitude and snr are computed in the high-frequency band as $AMP7 = 10 \cdot \log[\max(STA)]$ and $SNR7 = AMP7 - NOI7$, respectively, where $NOI7 = 10 \cdot \log[\min(LTA)]$. The *AMP7* and *SNR7* measurements are stored in the *amp* and *snr* attributes of the **amplitude** table, where *amptype* = `Hstavhi`.

The hydroacoustic signal feature used to indicate the presence of a bubble pulse is the size of the largest cepstral peak. Let *CPS8* denote the number of standard deviations above the mean for the largest cepstral amplitude, using the 2–80 Hz passband (band8) of a detected signal. This quantity is stored in the *cep_peak_std_signal* attribute of the **hydro_features** table, with *low_cut* = `2` and *high_cut* = `80`. Based on analysis of hydrophone data for underwater explosions, a cepstral peak is not considered significant if $CPS8 < 8.0$.

Based on the recommendations in [WGB01], the hydroacoustic screening criteria are only applied to events in the SEB that are detected and located by seismic data. Such events are screened out if all of the following conditions are satisfied:

1. The minimum water depth within the 90 percent location error ellipse is at least 500 meters (*min_wdepth* > 500 m), based on a two-minute bathymetry grid [Smi97] in the latitude range of ±72 degrees (the range for which the grid is valid).
2. The entire 90 percent location error ellipse does not overlap or contain any onshore portions of a 200-meter resolution coastline grid.
3. The entire 90 percent location error ellipse has a clear path to at least one IMS hydrophone, based on the *clear_ellipse* function and signal blockage grids used in *libloc* at the IDC.
4. The noise level in the 32–64 Hz band (*NOI7*) for the predicted arrival time interval is within three standard deviations of the ambient noise level estimated over a long time interval.
5. There are no significant cepstral peaks (that is, *CPS8* < 8.0) in any of the associated signals from IMS hydrophones (indicating the absence of a bubble pulse).
6. The maximum STA energy minus the LTA noise in the high-frequency band for the predicted arrival time interval is less than 10 dB for all IMS hydrophones (that is, *SNR7* < 10 dB for all hydrophones).

The hydroacoustic screening score is defined in (10). The first five of the previous conditions must be satisfied, and *SNR7* must have a valid value to obtain a score.

$$\mathrm{SCORE}_{\mathrm{Hydro}} = 1 - SNR7/10.0 \qquad (10)$$

Otherwise, the hydroacoustic screening score is set to –999.0 (NULL). For a given event, $\mathrm{SCORE}_{\mathrm{Hydro}}$ is computed for each associated hydrophone. The minimum valid station score is provided in the SEB for applicable events.

Event-Screening Categories

Table 1 defines the event-screening categories and the corresponding standard criteria. At present, the standard event-screening criteria are not applied to events below m_b 3.5 and these events are put in the "Not Considered" category. Events that lack adequate event characterization parameters to apply any of the screening

criteria are put in the "Insufficient Data" category. Events for which at least one of the screening criteria can be applied, but for which the criteria are not satisfied, are put in the "Not Screened Out" category. Last, events are screened out if $SCORE_{Depth}$ or $SCORE_{Ms:mb}$ or $SCORE_{Regional}$ or $SCORE_{Hydro}$ is greater than zero. Only events in this "Screened Out" category are excluded from the SSEB.

Location error ellipses at the default 90 percent confidence level are used to categorize events as Offshore, Onshore, or Mixed (partially Onshore and Offshore). A bathymetry grid with two-minute resolution (including islands) is used for this determination. The fraction of offshore grid cells within or touching the error ellipse, *Foffshore*, is computed and provided in the SEB and SSEB. Table 2 defines the location categories. Each event in the SEB is assigned to one of the screening categories in Table 1 and to one of the location categories in Table 2.

TABLE 1: SEISMIC-ACOUSTIC EVENT-SCREENING CATEGORIES AND CRITERIA

Screening Category		Screening Criteria
Not Considered		$m_b < 3.5$
Insufficient Data		$SCORE_{Depth} = -999$
	and	$SCORE_{Ms:mb} = -999$
	and	$SCORE_{Hydro} = -999$
	and	$SCORE_{Regional} = -999$
Not Screened Out		$SCORE_{Depth} \leq 0$
	and	$SCORE_{Ms:mb} \leq 0$
	and	$SCORE_{Hydro} \leq 0$
	and	$SCORE_{Regional} \leq 0$
	and	at least one score is greater than –999

TABLE 1: SEISMIC-ACOUSTIC EVENT-SCREENING CATEGORIES AND CRITERIA (CONTINUED)

Screening Category	Screening Criteria	
Screened Out		$SCORE_{Depth} > 0$
	or	$SCORE_{Ms:mb} > 0$
	or	$SCORE_{Hydro} > 0$
	or	$SCORE_{Regional} > 0$

TABLE 2: LOCATION CATEGORIES

Category	Criterion	Definition
Offshore	*Foffshore* = 1.0	location ellipse contains and touches only offshore cells
Onshore	*Foffshore* = 0.0	location ellipse contains and touches only onshore cells
Mixed	0.0 < *Foffshore* < 1.0	location ellipse contains or touches one or more onshore and offshore cells

Performance Characteristics

Table 3 provides typical ESS execution times for cases where results are actually computed and not simply extracted from the database as an example of subsystem performance. Execution time is most directly related to the number of events processed. It is also affected by system load and database access. No hard limits are set on the number of events that can be processed per execution of *evsc_drv*.

ESS error rates and expected reliability are primarily related to database and file system availability. Except for failures of the database/filesystem access, the ESS performs reliably.

TABLE 3: EVENT SCREENING SUBSYSTEM EXECUTION TIMES

Days Processed (Number of Events)	Execution Time		
	Web Mode	Automatic Mode	AutoDRM Mode
1 (77)	73 s	15 s	20 s
2 (138)	90 s	33 s	80 s
5 (314)	120 s	51 s	164 s
10 (606)	170 s	87 s	231 s

Related Tools

A daily *cron* job executes script *go_batch_daily*, which subsequently calls a Perl script *clean.pl* to remove old content from the `$EVSC_WEB/runs` directory. In addition, *go_batch_daily* calls the Perl script *hist_update* to add data to the monthly/yearly histogram plots of screening performance summaries.

INVENTORY

Files, database tables, and database accounts are needed for ESS operation.

Files

Files for automatic and Web ESS processing contain scripts, programs, libraries, par files, and Web pages. Refer to [IDC6.5.19] for a listing of software components required for *AutoDRM* processing.

Automatic Processing

Table 4 describes the files needed to operate the ESS in automatic mode.

TABLE 4: INVENTORY OF EVENT SCREENING SUBSYSTEM FILES

File	Description
evsc_drv	event-screening-driver executable
go_evsc	Perl script for automatic processing
libevsc.a	linkable event-screening library
`evsc.par`	parameter file for *go_evsc*
`topo_6.2.img.modified`	enhanced bathymetry/topography grid with two-minute resolution
sta`.bayes.xyz`	correction data file for station *sta* [1]

1. These files contain station-specific source corrections and uncertainties for regional P/S amplitude ratios to account for path variations. One file is provided for each IMS seismic station.

Web Processing

This section describes the directory structure (see Figure 9) and contents for the portion of the ESS that supports Web interface functions. `$EVSC_WEB` refers to the top-level Web directory for the ESS. The main `$EVSC_WEB` directory includes the following files:

- `index.html`

  This blank HTML page is for security, so that the directory content cannot be viewed or downloaded.

- `web-bin`

  This file is a symbolic link to `/web/web-contents/web-bin`.

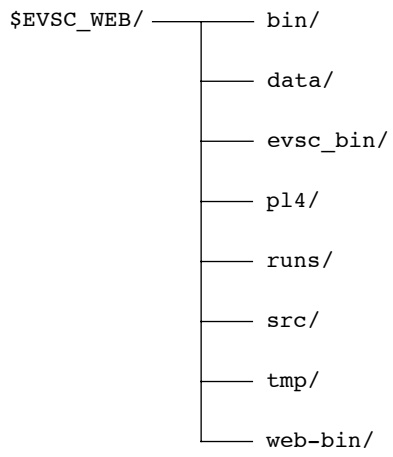


FIGURE 9. $EVSC_WEB DIRECTORY STRUCTURE

The `$EVSC_WEB/bin/` directory contains Perl scripts and executables that perform server-side processing by the ESS. They support processing requested by the CGI scripts that are in `$EVSC_WEB/evsc_bin/` (see below). This directory contains the following files and scripts:

- *clean.pl*

  This Perl script is called by *go_batch_daily.pl* to clean the `$EVSC_WEB/runs/` directory.

- *evsc_drv*

  This file is a symbolic link to the installed executable *evsc_drv*.

- *go_evsc.pl*

  This Perl script prepares inputs, calls *evsc_drv*, and creates results directories, plots, and files. The script is called by *form1.pl*, *form2.pl*, *go_form.pl*, *go_top.pl*, and *run_case.pl*. It calls *check1* to validate form input field values.

- *run_case.pl*

  This Perl script prepares, executes, and cleans up after an event-screening run. The script is called by *form1.pl* to retrieve event data from the database and by *form2.pl* to perform event-screening processing.

The `$EVSC_WEB/evsc_bin/` directory contains CGI scripts to interface the ESS to the Web and must be defined as such in the Web server configuration file. The top-level scripts *go_top.pl* and *go_form.pl* initiate standard and custom event-screening processing, respectively. Other scripts in this and the `$EVSC_WEB/bin/` directory perform lower-level utility functions to generate screening results and graphics. The `$EVSC_WEB/evsc_bin/` directory contains the following main scripts:

- *Control.pl*

  This script handles all FORM tag ACTIONS. It organizes and controls all of the Web click and push-button functions. *Control.pl* also is used to call *go_top.pl* to produce standard screening pages, as requested.

- *env.pl*

  This Perl "require" file contains system-dependent configuration parameters. This file must be modified if the Web directory structure on the Web server machine is modified.

- *form1_init.pl*

  This script initializes the UNIX environment with event-screening defaults and displays for the Custom Event Screening Form (*form_all.pl*) or the Custom Event Characterization Run page (*form1.pl*).

- *form_all.pl*

  This script is called by *form1_init.pl* to retrieve event parameter data from the database and create the Custom Event Screening Form page.

- *form1.pl*

  This script is called by *form1_init.pl* to retrieve event parameter data from the database and create the Custom Event Characterization Run page. It calls the *go_evsc.pl*, *run_case.pl* and *map_table.pl* utility scripts.

- *form2.pl*

  This script generates the Event Screening Results page. It is called by *Control.pl* when the Submit Run button is selected on the Custom Event Characterization Run page (*form1.pl*). It calls the *go_evsc.pl*, *run_case.pl*, and *map_table.pl* scripts.

- *go_batch_daily.pl*

  This top-level script updates performance summaries (calls *hist_update.pl*) and performs daily clean-up functions on the `runs` directory (calls *clean.pl*) via a `crontab` entry.

- *go_form.pl*

  This top-level script creates the Executive Summary and other screening results pages for a custom event-screening request. This script is activated by the Submit Run button on the Custom Event Screening Form (*form_all.pl*) and calls the *go_top.pl* script.

- *go_top.pl*

  This top-level script creates the Executive Summary and other screening results pages for a standard request. This script is activated interactively by the *Control.pl* script.

- *hist_update.pl*

  This script is called by *go_batch_daily.pl* to update monthly event-screening performance histogram plots.

The `$EVSC_WEB/pl4/bin/` directory contains the *pl4gif* executable, which produces plots in Graphics Interchange Format (GIF) for display on the Web. (*PL4* is a general purpose plotting package developed by Mission Research Corporation.)

The `$EVSC_WEB/web-bin/stacap/` directory contains the scripts needed to produce the station capability maps and histograms displayed on the Web.

This `$EVSC_WEB/data/` directory contains data files to support server-side processing for the ESS. The files include par files of input parameters to the screening code, map overlays, screening performance summary data, and icons for the IMS Network Status legend on the Web version of the Executive Summary.

This `$EVSC_WEB/runs/` directory contains results of automatic and interactive event-screening runs to produce Executive Summaries, SEBs, SSEBs, and associated maps and other graphics on the Web.

The `$EVSC_WEB/tmp/` directory contains temporary log files and SQL queries.

Tables 5 through 13 describe the complete inventory of files required by the ESS for the Web processing mode.

TABLE 5: $EVSC_WEB

File	Description
`index.html`	blank HTML page for security
make_dirs.pl	script that creates directories with appropriate permissions
`web-bin`	symbolic link to the `/web/web-content/web-bin/` directory

TABLE 6: $EVSC_WEB/BIN

File	Description
cgi-lib.pl	symbolic link to `$EVSC_WEB/evsc_bin/cgi-lib.pl`
check1	C executable that checks input form fields
clean.pl	script that cleans `$EVSC_WEB/runs/` directory
env.pl	symbolic link to `$EVSC_WEB/evsc_bin/env.pl`
evsc_drv	symbolic link to the *evsc_drv* executable
get_db_str	database query program that uses the Generic Database Interface (GDI)
get_results.pl	script called by *form2.pl* that extracts screening results from the database
get_unique.pl	script that generates unique identifiers

TABLE 6: $EVSC_WEB/BIN (CONTINUED)

File	Description
go_evsc.pl	utility Perl script that checks input form fields, executes *evsc_drv*, creates directories, and generates plots of screening results
index.html	blank HTML page used for security
map_data	symbolic link to `$WEB/web-bin/network/map_data`
evsc-lib.pl	symbolic link to `$EVSC_WEB/evsc_bin/evsc-lib.pl`
pltcat.pl	script that generates screening category plots
pltdepth_mb.pl	script that creates depth versus m_b plots
pltdepth_msmb.pl	script that creates depth versus m_b–M_s plots
pltmbms_mb.pl	script that creates m_b–M_s versus m_b plots
pltyear_summ.pl	script that creates screening performance summary histogram plots
run_case.pl	script that prepares, executes, and cleans up *evscreen* run; it calls *go_evsc.pl*
statf.pl	script that creates screening performance statistics for histogram plots
tdiff	C executable time difference program

TABLE 7: $EVSC_WEB/EVSC_BIN

File	Description
cgi-lib.pl	CGI utility library that decodes form inputs
Control.pl	script that handles all FORM tag ACTIONs
`default_env_file`	default environment settings
dump_environment.pl	script that writes UNIX environment to a file
env.pl	Perl environment configuration file

TABLE 7: $EVSC_WEB/EVSC_BIN (CONTINUED)

File	Description
eventlist.pl	script that generates event list for Quick-Look map
footer-evscreen.pl	script that generates footer for screening pages
form1.pl	script that creates Custom Event Characterization Run page
form1_init.pl	script that initializes custom runs (calls *form1.pl* or *form_all.pl*)
form2.pl	script that generates screening results
form3.pl	script that creates Screening Details page
form_all.pl	script that creates Custom Event Screening Form
getpar.pl	Perl library that reads parameter settings
go_batch_daily.pl	top-level processing script for *cron* job
go_form.pl	top-level Custom Screening Run script
go_link.pl	script that re-directs hyperlinks to proper Uniform Resource Locator (URL)
go_top.pl	batch processing script called by *go_form.pl*
header-evscreen.pl	script that generates header for screening pages
help_key.pl	help page functions
hist_update.pl	performance histogram update script
imagemap	CGI script that gets coordinates from clickable map
`index.html`	blank HTML page for security
make_plot2.pl	*PL4* plotting wrapper used for results plots
make_plot3.pl	*PL4* plotting wrapper used for *year_summ*
make_plot_viewer.pl	plot view page script
make_plot_viewer_gen.pl	generic plot view page script
make_table.pl	script that generates output parameter table
makemap.pl	script that creates map and clickable functions

TABLE 7: $EVSC_WEB/EVSC_BIN (CONTINUED)

File	Description
map_frame.pl	script that generates clickable quick-look map
map_table.pl	Perl wrapper for map window dressing
evsc-lib.pl	Perl library of low-level generic utilities
no_map.pl	script that handles non-clickable images
no_op.pl	script that handles invalid map clicks
quicklook.pl	top-level script used for quick-look display
results.pl	script that creates Screening Summary page
stacap.pl	script that generates the station capability summary
station_markers.pl	script that defines symbols for various station types
top_level.pl	script that creates top-level results pages
under_construction.pl	script that creates "under construction" page
year_summ.pl	script that creates performance histogram plots

TABLE 8: $EVSC_WEB/PL4/BIN

File	Description
pl4gif	*PL4* executable used to generate GIF plots

TABLE 9: $EVSC_WEB/WEB-BIN/STACAP

File	Description
bulllib.pl	library of support routines
cgi-lib.pl	library of CGI routines
env.pl	symbolic link to `$EVSC_WEB/evsc_bin/env.pl`

TABLE 9: $EVSC_WEB/WEB-BIN/STACAP (CONTINUED)

File	Description
stacaphist	station capability histogram script
stacapmap	station capability mapping script
weblib.pl	Web support routines

TABLE 10: $EVSC_WEB/SRC/WEB_SUPPORT

File	Description
`check1.c`	program that checks validity of Web form inputs
`get_db_str.c`	code for database access using the GDI
`tdiff.c`	time conversion utility

TABLE 11: $EVSC_WEB/DATA

File	Description
`gregion.lst`	flat file of the **gregion** table
`db.par`	par file for the *evsc_drv* program

TABLE 12: $EVSC_WEB/DATA/HIST

File	Description
year`.pl4d`	screening performance data for year = *year*[1]

1. Screening performance data files are provided for 1995 through 2001.

TABLE 13: $EVSC_WEB/DATA/ICONS

File	Description
bluebar.gif	blue bar image
greenbar.gif	green bar image
orangebar.gif	orange bar image
redbar.gif	red bar image
yellowbar.gif	yellow bar image

TABLE 14: $EVSC_WEB/DATA/MAPS

File	Description
political.map	political boundary overlay file
tectonic.map	tectonic overlay file

The $EVSC_WEB/runs/ directory contains results of automatic and interactive event-screening runs to produce Executive Summaries, SEBs, SSEBs, and associated maps/graphics on the Web. Dynamic data files are written by the ESS for display on the Web as triggered by a request from a user via the Web interface. The files are periodically removed from the system by the *clean.pl* script.

The $EVSC_WEB/runs/ directory contains alpha-numeric and graphical event-screening results for display on the Web. Subdirectory names are coded with a unique identifier based on either the date or a time/process identifier, depending on the type of request (standard product request, custom product request, or interactive custom run) that produced the results.

- Standard product requests produce directory names of the form: *YYYY*–*MM*–*DD*.*X*.dir, where *YYYY* = year, *MM* = month, *DD* = day, and *X* = r (top-level results directory) or e.1 (event-screening results).

- Custom product requests produce directory names of the form *DSTAMP*`.`*X*`.dir`, where *DSTAMP* = unique integer identifier, and *X* = `r` (top-level results directory) or `e.1` (event screening results).
- Interactive event screening runs produce directory names of the form *DSTAMP*`.`*X*`.dir`, where *DSTAMP* = unique integer identifier, and *X* = `r` (top-level results directory) or `e.1` (event screening results)

Table 15 provides examples of the various types of subdirectories produced under `$EVSC_WEB/runs/` and the naming conventions.

TABLE 15: $EVSC_WEB/RUNS (EXAMPLES)

Directory	Description
`1998-04-28.r.dir`	top-level directory of Standard Product results for display on the Web
`3123183625879.r.dir`	top-level directory Custom Product results for display on the Web
`3123183625879.e.1.dir`	results of Custom Product Screening run
`311718327251.dir`	screening results for an interactive run

Table 16 describes a typical example of a top-level results directory. Table 17 describes a screening results directory. File sizes vary depending on the particular run.

TABLE 16: $EVSC_WEB/RUNS/YYYY-MM-DD.R.DIR

File	Description
`.done`	run finished indicator
`custom_env`	dump of environment
`form2.total.1.html`	results details for All Events
`proc_time.lst`	symbolic link to `$EVSC_WEB/runs/`*YYYY-MM-DD*`.r.dir/proc_time.lst`
`results_data`	miscellaneous data for display scripts

TABLE 16: $EVSC_WEB/RUNS/YYYY-MM-DD.R.DIR (CONTINUED)

File	Description
results_tot.html	Event List for All Events
rn.lst	radionuclide data, if available
stations	station list flat file
test_origin.update.pl4d	event screening results file
top_level.html	Executive Summary page (HTML)

TABLE 17: $EVSC_WEB/RUNS/YYYY-MM-DD.E.1.DIR

File	Description
.done	indicator that the run is finished
check.out	field check error results
env_file	environment definition file
error_file	file of run errors
evscreen_debug	*evsc_drv* error file
evscreen_out	*evsc_drv* output file
pltcat0	*PL4* file definition for category plot
pltcat01.gif	GIF image of category plot
pltdepth_mb.map	imagemap for depth plot
pltdepth_mb00	*PL4* file definition for depth plot
pltdepth_mb001.gif	GIF image of depth plot
pltdepth_msmb	*PL4* file for depth/m_b–M_s plot
pltdepth_msmb.map	image map for depth/m_b–M_s plot
pltdepth_msmb1.gif	GIF image of depth/m_b–M_s plot
pltmbms_mb.map	image map for m_b–M_s plot
pltmbms_mb00	*PL4* file for m_b–M_s plot

TABLE 17: $EVSC_WEB/RUNS/YYYY-MM-DD.E.1.DIR (CONTINUED)

File	Description
pltmbms_mb000.gif	GIF image of m_b–M_s plot
pltmbms_mb001.gif	GIF image of m_b–M_s plot
pltmbms_mb01	*PL4* file for m_b-M_s plot
pltmbms_mb010.gif	GIF image of m_b–M_s plot
stat.out	statistical summary file
stations	station list flat file
test_hydro.update.pl4d	event screening hydroacoustic file
test_origin.update.lw	event screening results file (*LiveWire*)
test_origin.update.pl4d	event screening results file
test_regional.update.pl4d	event screening regional file

Database Tables and Accounts

Table 18 lists the database tables required to operate the ESS, along with the database accounts and type of usage. The tables are described in [IDC5.1.1Rev2]. ESS automatic processing requires access to the operations database. ESS Web processing also requires access to the archive database. Database accounts used by the ESS are specified in a parfile, evsc.par.

TABLE 18: DATABASE TABLES REQUIRED BY ESS

Database Table	Account	Usage
affiliation	STATIC	read
amplitude	REB	read
arrival	REB	read
assoc	REB	read
attencoef	IDCX	read

TABLE 18: DATABASE TABLES REQUIRED BY ESS (CONTINUED)

Database Table	Account	Usage
dataready	IDCX	read/write
evsc_hydro	IDCX	read/write
evsc_prod	IDCX	read/write
evsc_regional	IDCX	read/write
hydro_features	REB	read
lastid	IDCX	read
netmag	REB	read
origerr	REB	read
origin	REB	read
parrival	REB	read
producttypeevsc	IDCX	read
producttypeorigin	IDCX	read
regcoef	IDCX	read
site	STATIC	read

The ESS reads parametric event data from the **amplitude**, **arrival**, **assoc**, **hydro_features**, **netmag**, **origerr**, **origin**, and **parrival** tables in the REB account. It accesses IMS network and station information from the **affiliation** and **site** tables, which are in the STATIC account. It uses the **producttypeorigin**, **producttypeevsc**, **dataready**, and **lastid** tables, which are in the IDCX account, to process standard and subscription products, including the application of national screening criteria and to notify the Message Subsystem that products (for example, SEB, SSEB, NEB, and NSEB) are available for distribution. It reads parameters needed to apply distance corrections to P/S amplitude ratios and to define the regional P/S screening criterion from the **attencoef** and **regcoef** tables, which are also in the IDCX account. Last, it reads from and writes to the **evsc_prod**, **evsc_hydro**, and **evsc_regional** tables. These tables store event-screening results and are in the IDCX account.

ENVIRONMENT AND STATES OF OPERATION

Environment

The ESS is designed to run on a Sun Microsystems workstation such as the SPARCstation 20/612. The hardware should be configured with a minimum of 64 MB of memory and 2 GB of magnetic disk space.

For automatic processing and *AutoDRM* request modes, the code requires the Solaris 7 or later version of the operating system. For Web-based operations, the code also requires an operational Web server running Netscape Enterprise Server. Directories containing ESS executables and scripts must be accessible to the server machines through UNIX Network File System (NFS) mounting or equivalent.

For external users to access the data products and interactively execute custom event screening requests via the IDC Web Subsystem, a Netscape browser (version 4.0 or greater) is required. Hardware needed by external users includes a personal computer, Macintosh, or workstation that is capable of running the Netscape browser and connecting to the Internet. A monitor with a diagonal dimension of at least 14 inches is recommended.

Table 19 lists COTS and public domain software required to operate the ESS. It includes names, version numbers, and brief descriptions of their functionality. Table 20 lists ESS dependencies on other IDC application software components.

TABLE 19: COTS AND PUBLIC DOMAIN SOFTWARE

Name	Version	Function
ORACLE	8.1.5.1.0	relational database management system
Perl	5.003	scripting software
Netscape Enterprise Server	3.0	Web server software

TABLE 19: COTS AND PUBLIC DOMAIN SOFTWARE (CONTINUED)

Name	Version	Function
earth2	1.0	earth mapping program
hash_util	1.12	hash table utility package
imagemap	1994	CGI Web support routine

TABLE 20: DEPENDENCIES ON OTHER IDC APPLICATION SOFTWARE COMPONENTS

Applications Software	Function
GDI library	C language generic database interface
getpar.pl	Perl utility package for parameter reading
AutoDRM	Automatic Data Request Management Subsystem
GSEBull	program that generates GSE formatted bulletins
libgsefmt	message formatting library
libloc	event location library
libgeog	geographic function library (used by *libloc*)
liblog2	program logging library
libpar	parameter processing library
libstdtime	standard time library, y2k compliant
SubsProcess	subscription processing
ParseSubs	subscription parsing
Astruct files	C include files that define database structures

Normal Operational State

The ESS operates in three normal states. The first (and most fundamental) operational state involves automatic application of the standard and subscription event-screening criteria after post-analysis processing of the event-characterization

parameters has completed. Automatic processing is initiated by the *tuxshell* in the Distributed Application Control System (DACS) as part of *rebdone*. This invokes *go_evsc*, which sets appropriate environments and calls *evsc_drv*, the main program of the ESS. After they are invoked by *rebdone*, *go_evsc* and *evsc_drv* execute to completion.

In the second normal operational state ESS is invoked by the Web Subsystem user interface. The Web interface includes user requests for standard products, such as the SEB, SSEB, and Executive Summary, or submission of alternate event-screening criteria via the Custom Event Screening Form to generate custom versions of these products. After *evsc_drv* is invoked by a Web user request, it executes to completion, and Web pages of the requested product are created by the ESS Web Perl scripts and displayed.

In the third normal operational state *get_evscsum* (of *libevsc*) is invoked by the Message Subsystem for requests by *AutoDRM* users via email for standard or custom (involving alternate event-screening criteria) products. After *get_evscsum* is invoked by an *AutoDRM* user request, it either accesses pre-computed results from the database or applies custom screening criteria to applicable events. It then returns the parametric results to *idc_bulletin*, which formats the results as the EVENT SCREENING block. The Message Subsystem then emails the product to the requestor.

Contingencies/Alternate States of Operation

The *evsc_drv* program can be executed from the command line in emergencies or if special off-line processing is required. The program requires a properly configured par file to operate. The par file settings are described in "Configuration Data Files" on page 68. Outputs can be sent to the filesystem or to the database, as desired. Refer to "Chapter 3: Troubleshooting" on page 55 for more information about diagnosing problems and executing the *evsc_drv* program from the command line.

Chapter 2: Operational Procedures

This chapter provides instructions for using the software and includes the following topics:

Chapter 2: Operational Procedures

SOFTWARE STARTUP

The ESS does not require any special startup procedures. For automatic processing, the ESS is invoked nominally on a nightly basis by *tuxshell* as part of *rebdone* in the DACS. For requests by Web users, the ESS is invoked by the Netscape Enterprise Server CGI. For requests by *AutoDRM* users, the ESS is invoked by the Message Subsystem. Any problems encountered during execution are written to the log file, as described in "Chapter 3: Troubleshooting" on page 55.

SOFTWARE SHUTDOWN

The ESS does not require a special shutdown procedure. After being invoked, the ESS executes to completion. A return value of zero indicates normal termination.

BASIC PROCEDURES

This section describes how to access the software, use basic commands, and end a session. The descriptions are organized by the operational modes of the ESS. Procedures for automatic processing are intended for internal operators at the IDC. Procedures for Web and *AutoDRM* modes are intended for external users.

Automatic Processing

After proper installation and configuration (see "Chapter 4: Installation Procedures" on page 65), automatic processing by the ESS does not require any operational procedures, other than basic maintenance and monitoring, as described in "Maintenance" on page 51 and "Monitoring" on page 56, respectively.

Web Standard Requests

The following procedure describes how Web users can access the standard products, such as the Executive Summary, SEB, and SSEB.

1. Start a Netscape browser (version 4.0 or higher).

   The Netscape browser appears on the screen.

2. Enter the IDC home page URL (for example, `http://www.ctbto.idc.org`), and press the return key on the keyboard.

   The IDC home page appears in the browser.

3. Click the "Products" link on the IDC home page.

   The Executive Summary page for the most recent day for which the REB has been produced is displayed within about one minute. (Figure 10 shows an example of an Executive Summary.)

4. To modify the time period for which the Executive Summary is displayed, enter desired dates in the "Start Date" and "End Date" fields in the left frame of the page. Alternatively, adjust the dates using the control buttons below these fields. After you have modified these dates, click the "Executive Summaries" link below the time tools.

   The Executive Summary page for the specified date range is displayed in the window within about one minute.

5. To view listings of seismic-acoustic and radionuclide events in various event-screening categories, click the corresponding links in the table below the map on the Executive Summary page. For example, click the "Total Worldwide" link to display a page with a map and list all SEB events for the specified date range.

6. To access the SEB or SSEB, click the "Additional Products" link in the left frame and then click the "SEB" or "SSEB" link. You may modify the date range for which these bulletins are displayed as in step 4.

   The SEB or SSEB page for the specified date range is displayed within about one minute. (Figure 11 shows an example of an SEB.)

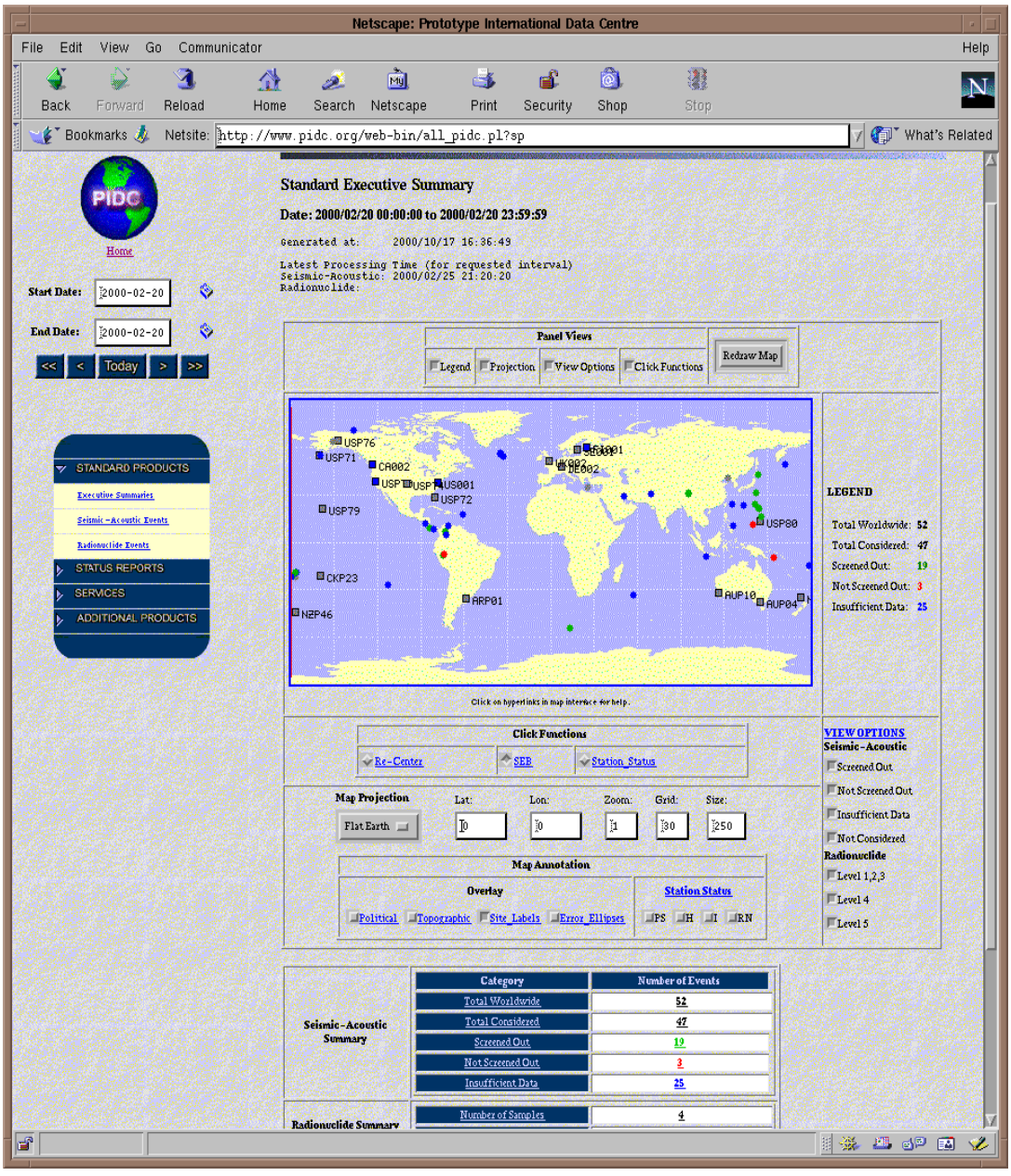


FIGURE 10. EXECUTIVE SUMMARY WEB PAGE

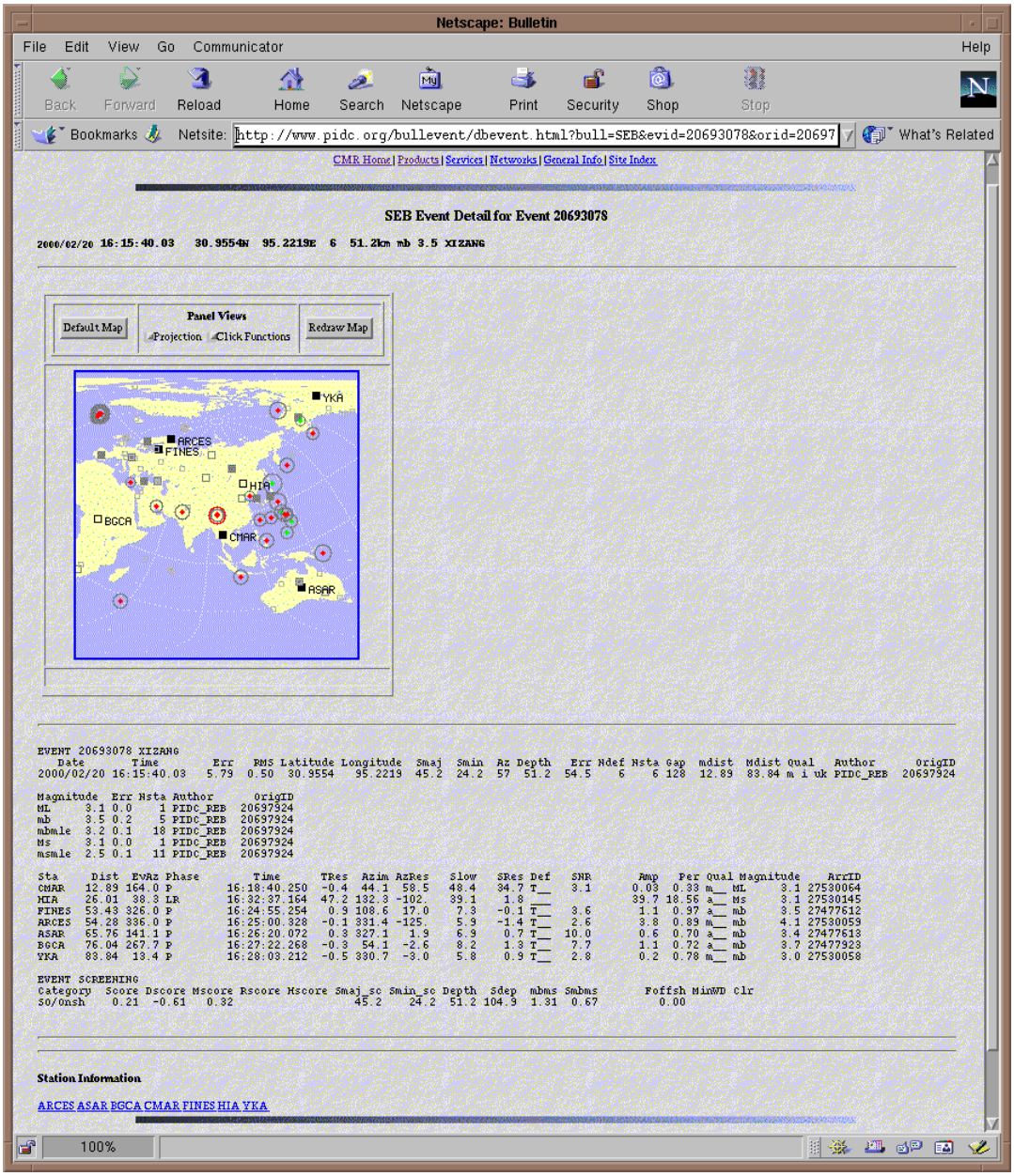


FIGURE 11. SEB WEB PAGE

Web Custom Requests

The following procedure describes how Web users can request custom event-screening products through the Custom Event Screening Form:

1. Start a Netscape browser (version 4.0 or higher).

   The Netscape browser appears on the screen.

2. Enter the IDC home page URL (`http://www.ctbto.idc.org`), and press the return key on the keyboard.

   The IDC home page appears in the browser.

3. Click the "Services" link on the IDC home page, or click the "National Screening" link of the "Services" submenu in the left frame of the "Products" page (see Figure 10 on page 42).

   The Custom Event Screening Form is displayed in the window with default input parameter values in the form fields (see Figure 12).

4. Enter alternate latitude, longitude, time range, magnitude restrictions, and event-screening criteria in the fields, as desired, and click the "Submit Run" button at the bottom of the page.

   A Custom Executive Summary page (similar to the one shown in Figure 10) corresponding to the specified input criteria is generated and displayed in the window within minutes, depending on the time range specified.

5. To view listings of seismic-acoustic and radionuclide events in various event-screening categories, click the corresponding links in the table below the map on the Executive Summary page.

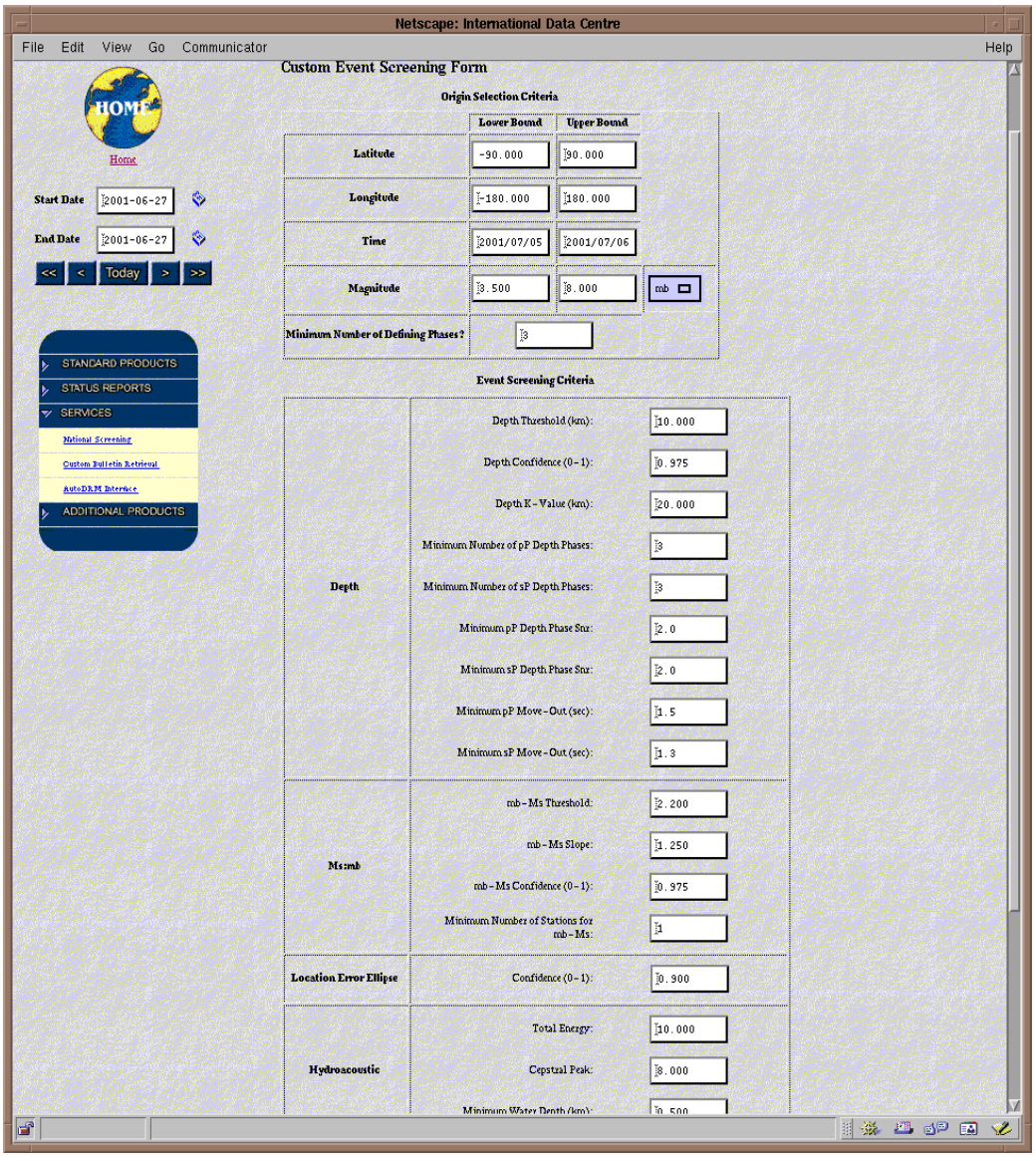


FIGURE 12. WEB CUSTOM EVENT SCREENING FORM

AutoDRM Standard Requests

The following procedure describes how to make *AutoDRM* requests for the SEB, SSEB, and Executive Summary by sending email to the Message Subsystem or by using the Web interface to *AutoDRM*. Refer to [IDC3.4.1Rev2] for detailed descriptions of formats and protocols for messages pertaining to the SEB, SSEB, and Executive Summary.

1. To request the SEB, submit a properly formatted message via email to the Message Subsystem. For example, the following message requests the IDC_SEB for 10 June, 1998 with no restrictions:

   ```
   BEGIN IMS1.0
   MSG_TYPE REQUEST
   MSG_ID 1040 ANY_NDC
   E-MAIL NAME@MY.COMPUTER
   TIME 1998/06/10 TO 1998/06/11
   BULL_TYPE IDC_SEB
   BULLETIN IMS 1.0
   STOP
   ```

   In this example, the Message Subsystem sends the SEB for 10 June, 1998 by email to the requester.

2. To request the SSEB for 10 June, 1998, change the BULL_TYPE environment line in the previous message to the following:

   ```
   BULL_TYPE IDC_SSEB
   ```

   The Message Subsystem sends the SSEB for 10 June, 1998, by email to the requester.

3. You can use all of the existing environments for the SEB, defined in [IDC3.4.1Rev2], to place restrictions on SEB and SSEB requests and subscriptions. For example, the following message requests the IDC_SEB for events on 10 June, 1998, between magnitudes m_b 4.0 and 6.0, and within an area defined by latitude and longitude ranges:

```
BEGIN IMS1.0
MSG_TYPE REQUEST
MSG_ID 1040 ANY_NDC
E-MAIL NAME@MY.COMPUTER
TIME 1998/06/10 TO 1998/06/11
BULL_TYPE IDC_SEB
MAG 4.0 TO 6.0
LAT 60 TO 90
LON 45 TO 75
BULLETIN IMS 1.0
STOP
```

The Message Subsystem sends the SEB for events on 10 June, 1998, between m_b 4.0 and 6.0 in the specified latitude and longitude range by email to the requester.

AutoDRM Custom Requests

You can make *AutoDRM* requests for the NEB, NSEB, and national versions of the Executive Summary, involving custom event-screening criteria by sending email to the Message Subsystem or by using the Web interface to the Message Subsystem. The NEB and NSEB request environments include those for the SEB, as well as ones pertaining to custom event-screening criteria that are summarized in Table 21 and described in detail in [IDC3.4.1Rev2]. The BULL_TYPE environment must be either IDC_NEB or IDC_NSEB to use the environments listed in Table 21. Default values for the screening input parameters are used for all criteria that are not modified in a request environment line.

TABLE 21: NEB AND NSEB REQUEST ENVIRONMENTS

Environment Name	Description	Default
depth_conf	depth screening confidence level (0–1)	0.975
depth_kvalue	depth model uncertainty in kilometers	20.0
depth_thresh	depth screening threshold (km)	10.0

TABLE 21: NEB AND NSEB REQUEST ENVIRONMENTS (CONTINUED)

Environment Name	Description	Default
hydro_cp_thresh	hydroacoustic cepstral peak threshold	8.0
hydro_te_thresh	hydroacoustic total energy threshold (dB)	10.0
loc_conf	location error ellipse confidence level (0–1)	0.90
magpref_mb	type of m_b magnitude measurement to use	mb_ave
magpref_ms	type of M_s magnitude measurement to use	ms_ave
mbms_conf	$A \cdot m_b – M_s$ screening confidence level (0–1)	0.975
mbms_slope	slope (A) of $A \cdot m_b – M_s$ relation	1.25
mbms_thresh	$A \cdot m_b – M_s$ screening threshold (magnitude units)	2.20
mb_err	single-station m_b magnitude uncertainty	0.34
min_dp_snr_pp	minimum depth phase snr to use a pP depth phase	2.0
min_dp_snr_sp	minimum depth phase snr to use a pP depth phase	2.0
min_mb	minimum m_b magnitude cutoff to consider event	3.5
min_moveout_pp	minimum moveout of pP–P travel times (s)	1.5
min_moveout_sp	minimum moveout of sP–P travel times (s)	1.3
min_ndef	minimum number of defining phases	3
min_ndp_pp	minimum number of pP depth phases	3
min_ndp_sp	minimum number of sP depth phases	3
min_nsta_Ms	minimum number of stations for valid M_s	1
min_wdepth_thresh	minimum ocean water depth threshold (km)	0.5
ms_err	single-station M_s magnitude uncertainty	0.23
reg_conf	regional P/S screening confidence level (0–1)	0.995

As an example, the following message requests an IDC_NEB for events on 10 June, 1998, between magnitudes m_b 4.0 and 6.0, within an area defined by latitude and longitude ranges and using custom depth and Ms:mb (m_b minus M_s) screening criteria:

```
BEGIN IMS1.0
MSG_TYPE REQUEST
MSG_ID 1040 ANY_NDC
E-MAIL NAME@MY.COMPUTER
TIME 1998/06/10 TO 1998/06/10
BULL_TYPE IDC_NEB
MAG 4.0 TO 6.0
LAT 60 TO 90
LON 45 TO 75
DEPTH_THRESH 20.0
DEPTH_CONF 0.99
MBMS_SLOPE 1.5
MBMS_THRESH 3.5
MBMS_CONF 0.99
MIN_NSTA_MS 2
BULLETIN IMS 1.0
STOP
```

As a result, the Message Subsystem sends the NEB for all events in the SEB on 10 June, 1998, between m_b 4.0 and 6.0 and in the specified latitude and longitude range, but with custom depth and Ms:mb screening criteria applied, via email by the Message Subsystem to the requester.

In the previous example, you could set the BULL_TYPE environment to IDC_NSEB to exclude events that were screened out by the custom event-screening criteria.

Subscriptions

You can establish subscriptions to the SEB, SSEB, Executive Summary, and national versions of these products via email or by using the Web interface to the Message Subsystem. Request environments include those for the SEB, as well as ones pertaining to the custom event-screening criteria that are listed in Table 21 and described in detail in [IDC3.4.1Rev2].

As an example, the following message requests a subscription to the daily IDC Executive Summary (IDC_ES) with no restrictions:

```
BEGIN IMS1.0
MSG_TYPE SUBSCRIPTION
MSG_ID 1040 ANY_NDC
E-MAIL NAME@MY.COMPUTER
FREQ DAILY
BULL_TYPE IDC_ES
BULLETIN IMS 1.0
STOP
```

As a result, the Message Subsystem sends the standard Executive Summary via email to the subscriber on a daily basis.

The Executive Summary contains summaries of the number of events in the SEB and those in the various screening categories; the number of radionuclide detections and those categorized as Level 4 or Level 5; and status metrics regarding the IMS network, GCI communications, IDC processing, and Radionuclide Laboratories. It includes the time interval for which the results were requested, the time at which it was generated, and the times at which the latest seismic-acoustic and radionuclide processing were performed. The format is defined in [IDC3.4.1Rev2].

In the previous example, you could set the BULL_TYPE environment to IDC_SEB or IDC_SSEB. The BULL_TYPE environment must be IDC_NES, IDC_NEB, or IDC_NSEB to use the environments listed in Table 21.

MAINTENANCE

Maintenance Procedures for Automatic Processing

Check the database on a regular basis to verify that screening results are being processed. Details regarding specific data items to check are discussed in "Monitoring" on page 56.

Maintenance Procedures for Data

The Database Administrator (DBA) should maintain the data in the **evsc_prod**, **evsc_hydro**, **evsc_regional**, **producttypeevsc**, **attencoef**, and **regcoef** tables according to standard procedures for the entire operations database. No other special maintenance procedures are required for these database tables.

Periodically, new IMS stations become operational and/or start sending data to the IDC. For the ESS to use data from these new stations, some modifications to the `evsc.par` parfile are necessary. For hydroacoustic stations, estimate the long-term average and standard deviation of the ambient noise in the high-frequency band (32–64 Hz) and place these estimates into `evsc.par` variables *hydro_noi_ave* and *hydro_noi_sigma*, respectively. The values are given as "station name:value" pairs.

For seismic stations, provide attenuation and region-specific correction information. The database table **attencoef** contains attenuation coefficients for each station. To add a new station, add two new rows for *sta* = *station_name* and *ratiotype* = (`PnSn`, `PnLg`) for a given *attenid* and *chan* = `rms6-8`. Use generic coefficients until a calibration is performed. In addition, create a correction file named *station_name*`.bayes.xyz`, and place this file in the directory pointed to by the *bayesdata_path* parameter in the `evsc.par` file. This file can be generic, representing zero correction and maximum uncertainty, until a calibration is performed.

Event-screening results written to the `$EVSC_WEB/runs/` directory (during ESS Web processing) are automatically cleaned up by the *clean.pl* script, which is invoked by the *go_batch_daily.pl* script.

The following procedure describes how to free space on the filesystem and is intended for the Web Administrator:

1. Check the size of the `runs/` directory on a monthly basis by typing the command:

   ```
   du $EVSC_WEB/runs
   ```

   This command returns the number of bytes of disk space used by content in this directory.

2. If the returned byte count is greater than acceptable, then run the *clean.pl* script manually using the command:

   `$EVSC_WEB/clean.pl` *dir_type age_limit*

   dir_type = `custom` or `standard` for directories created by custom or standard (automatic) event-screening runs, respectively (the default is `custom`); and *age_limit* = age of directories in days that are deleted (the default is 60).

Running this script with a small value of *age_limit* (for example, 5) frees significant disk space. However, results older than *age_limit* will no longer be readily available and must be re-generated, if requested.

SECURITY

Security for the ESS is provided by ownership of the process. Operators are able to run *go_evsc* from the command line if they have the permissions to read the data files defined in `evsc.par` and to access the relevant database accounts.

If operators have update permissions for the database accounts, they can potentially remove, add, or manipulate data in the account. For example, they can delete rows in the **producttypeevsc**, effectively inactivating a subscription. They can drop, delete, or truncate tables and remove or update records from the tables. Database passwords and accounts are stored in `process.par`. Anyone with proper permission to view this file can retrieve database passwords and has the ability to corrupt

database accounts (for example, truncate a table, drop a table, remove **producttypeevsc** records, and so on). Access to these files is controlled using UNIX permissions.

Chapter 3: Troubleshooting

This chapter describes how to identify and correct problems related to the Event Screening Subsystem and includes the following topics:

Chapter 3: Troubleshooting

MONITORING

ESS operators check the status of automatic processing by *go_evsc* on a daily basis. To check the status for a given day (for example, 10 February 1998, *jdate* = `1998041`), perform the following procedure:

1. Using the following SQL*Plus query, check the **dataready** table for rows containing *tagid* = `1998041` and *tablename* = `evchar`.

   ```
   select * from dataready
   where tagid=1998041 and tablename='evsc_prod';
   ```

   There should be one row per unique *prodid* as defined in table **producttypeevsc**.

2. If rows for the appropriate *jdate* do not exist in the **dataready** table, manually run the *go_evsc* script with start and stop times as arguments (times may be obtained using the *h2e* conversion utility), using the following command where `$evsc_scripts`, `$evsc_par`, and `$evsc_bin` represent the installed locations of the *go_evsc* script, the `evsc.par` parfile, and the *evsc_drv* binary, respectively.

   ```
   $evsc_scripts/go_evsc start_time=887068800.000 \
   end_time=887155200.000 \
   evsc_screen_par=$evsc_par/evsc.par \
   event_screen_binary=$evsc_bin/evsc_drv \
   >& logfile
   ```

   This command processes the SEB events for 10 February 1998 and writes the appropriate rows to the **dataready** table. Use step 1 to check that the row has been generated.

3. If the rows for the appropriate *jdate* still do not exist in the **dataready** table, check the error messages in the log file for information that indicates the cause of the problem.

Monitor ESS automatic processing in near real-time using the *WorkFlow* display. ESS is represented in *WorkFlow* with *class* `PAR` and *name* `EVSC`. After an interval is queued for processing, it is represented in *WorkFlow* by one 24-hour interval in *state* `queued`. The states `evsc-started`, `evsc-failed`, or `done` represent the status of the process. The state `evsc-failed` indicates a problem and that the interval must be reprocessed.

In addition to checking the database and *WorkFlow*, browse through the log file to detect any anomalous error messages. It is advisable to set the debug flag to `2` to get a modest amount of debug information. Error messages are discussed in greater detail in the next section.

An error-free run ends with the line:

```
Error code 0 returned from evscreen
```

Monitor the ESS Web processing mode by examining the Web log file. Messages from the CGI Web scripts that prepare, run, and display screening results from the ESS are routed here. Common Web processing errors are listed below.

INTERPRETING ERROR MESSAGES

For both automatic and Web modes of the ESS, processing errors are most commonly due to configuration errors. For example, a database account or a pathname to a required data file might be misspelled. Such configuration problems produce error messages in the log file to help in diagnosing and fixing them.

Descriptions of error messages follow.

Error Messages for Automatic Processing Mode

Message:	`ess_evscreen – no origin data`
Description:	There were no events in the **origin** table for the given time span.
Action:	Check the time parameters, the database table name assigned to the *origin* parameter in `evsc.par`, the database name in `evsc.par`, and that there are events in the **origin** table for the time span.

Message:	`ess_evscreen – problem with origerr table`
Description:	No **origerr** data were found.
Action:	Check that the *origerr* parameter in `evsc.par` contains the proper table name.

Message:	`ess_evscreen – problem with netmag table`
Description:	No **netmag** data were found.
Action:	Check that the *netmag* parameter in `evsc.par` contains the proper table name.

Message:	`ess_evscreen – problem with hydro_features table`
Description:	No **hydro_features** data were found.
Action:	Check that the *hydro_features* parameter in `evsc.par` contains the proper table name.

Message:	`ess_evscreen – problem with amplitude table`
Description:	No **amplitude** data were found.
Action:	Check that the *amplitude* parameter in `evsc.par` contains the proper table name.

Message:	`ess_depth – problem with assoc table`
Description:	No **assoc** data were found.
Action:	Check that the *assoc* parameter in `evsc.par` contains the proper table name.

Message:	`ess_depth – problem with arrival table`
Description:	No **arrival** data were found for depth analysis.
Action:	Check that the *arrival* parameter in `evsc.par` contains the proper table name and that the content of the table is correct.

Message:	`evscreen: problem with reg Attencoef table`
Description:	The **attencoef** table for regional analysis was empty or not found.
Action:	Check that the *attencoef* parameter contains the proper table name and that the content of the table is correct.

Message:	`evscreen: problem with Regcoef table`
Description:	The **regcoef** table for regional analysis was empty or not found.
Action:	Check that the *regcoef* parameter contains the proper table name and that the content of the table is correct.

Message:	`evscreen: problem with reg Site table`
Description:	Site information pertaining to regional stations was not found.
Action:	Check that the *site* parameter contains the proper table name and that the *reg_net* parameter is correct.

Message:	`ess_depth_topex: ess_init_elev returns error`
Description:	The topographic data file could not be opened.
Action:	Check that the filename given by the *topexdata_path* parameter is correct.

Message:	`ess_bayes_init: filename error_string`
Description:	A regional analysis station correction file was not found.
Action:	Check the pathname given by the *bayesdata_path* parameter and that the correction file exists for the station. For a new seismic station, the correction file may not yet exist. If so, refer to "Maintenance" on page 51 for instructions.

Message:	`ess_init_hydro_blockage: problem with hydro Site table`
Description:	Site information for hydroacoustic stations could not be found in the **site** table.
Action:	Check that the *site* parameter contains the proper table name and that the *hydro_net_name* parameter is correct.

Message:	`evsc_drv: dataready records exist for prodid = xxxx in the specified timespan`
Description:	Data already exist in the specified timespan. This error occurs during automatic mode only.
Action:	This warning indicates that data have already been processed for this time interval. No remedial action is required.

Message:	`error opening database: name`
Description:	The specified database could not be opened.
Action:	Check the spelling of the database name.

Error Messages for Web Processing Mode – External Users

Message:	`URL not Found - Error 404`
Description:	The requested Web page could not be found. The most likely cause of this message is a misconfiguration of the ESS on the Web host machine.
Action:	Contact the Web Administrator.

Message:	`Event Screening Parameters Input Error: An input error was encountered. Error: explanation`
Description:	All fields of the Custom Event Screening Form are checked, both typographically and for valid value ranges. This error occurs if a field(s) is found to be erroneous in some way.
Action:	Note the field(s) in question, go back to the Custom Event Screening Form, correct these fields, and re-submit the request.

Error Messages for Web Processing Mode – Internal Users

Message: `[`*date/time*`] failure: for host` *request_hostname* `trying to GET` *filename*`, parse-html reports: error opening` *filename* `(No such file or directory)`

Description: A file has been requested that does not exist on the Web host machine. This error is typically due to a misconfiguration of the ESS, but may also be caused by an unsuccessful execution of *evsc_drv*.

Action: Check the settings defined in *env.pl*, and verify that all pathnames have been correctly spelled and that the directories specified exist with read permission. Also, check the *evscreen_out* file in the `runs/` directory, and look for errors as described in "Error Messages for Automatic Processing Mode" on page 58. Obtain the `runs/` directory name from the filename in the error message. Look in the directory of the form: *pathname/cache_id*`.e.1.dir/`.

Message: `cache hit –` *cache_id cache_tag*

Description: A requested run matches a previous case.

Action: No action is needed. This is not an error but an informative message that the user has requested a custom run or Standard Executive Summary that exactly matches a case already existing in the `runs/` directory. The cached results are used instead of executing a new run.

Message:	`Control.pl: regenerate` *runpathname*`/top_level.html`
Description:	A Standard Executive Summary that does not currently exist in the data subdirectory was requested.
Action:	No action is needed. This is not an error but an informative message. The Standard Executive Summary, which the user has requested, is generated on-the-fly and stored.

Error Messages for AutoDRM Processing Mode

There are no additional error messages for cases when the ESS is invoked via *AutoDRM*. Explanations given under "Error Messages for Automatic Processing Mode" on page 58 are applicable in this case.

Error Recovery

In an emergency such as failed automatic execution, execute the ESS from the UNIX command line to produce event-screening results for the database, as described in "Monitoring" on page 56.

REPORTING PROBLEMS

The following procedures are recommended for reporting problems with the application software:

1. Diagnose the problem as far as possible.
2. Record information regarding symptoms and conditions at the time of the software failure.
3. Retain copies of relevant sections of application log files.
4. Contact the provider or maintainer of the software for problem resolution if local changes of the environment or configuration are not sufficient.

External Web users should report problems to the Web Administrator using the email link provided on IDC Web pages.

Chapter 4: Installation Procedures

This chapter provides instructions for installing the software and includes the following topics:

Chapter 4: Installation Procedures

PREPARATION

No special preparations are needed to install components of the ESS that support automatic processing and requests via the Message Subsystem. For Web processing components of the ESS, create a directory structure on the Web server machine that contains the following directories:

`$EVSC_WEB/`	top-level Web directory for the ESS
`$EVSC_WEB/bin/`	directory for Perl scripts for ESS actions
`$EVSC_WEB/evsc_bin/`	directory for Perl scripts for CGI actions
`$EVSC_WEB/pl4/bin/`	directory for *PL4* plotting executable
`$EVSC_WEB/data/`	directory for ESS parfile and support data
`$EVSC_WEB/data/maps/`	directory for map data files
`$EVSC_WEB/data/hist/`	directory for screening histogram data storage
`$EVSC_WEB/data/icons/`	directory for miscellaneous Web image files
`$EVSC_WEB/runs/`	storage directory for Web event-screening results
`$EVSC_WEB/tmp/`	temporary directory for logfiles and SQL queries

Specify the directory paths in par files, as discussed in "Configuration Data Files" on page 68. The directory structure is described in more detail in "Inventory" on page 21. Set the permissions for the `$EVSC_WEB/runs/` and `$EVSC_WEB/tmp/` directories to give the Web server group write permission.

Obtaining Released Software

Obtain the software via FTP from a remote site or via a physical medium, such as tape or CD-ROM. The software and associated configuration data files are stored as one or more tar files. Transfer the software to an appropriate location on a local hard disk. Untar the tar files into a standard UNIX directory structure.

Hardware Mapping

Hardware on which to run components of the ESS that support automatic processing and requests via the Message Subsystem (namely, *evsc_drv*, *go_evsc*, and *libevsc*) should be selected by operations staff. Software components are generally mapped to hardware to be roughly consistent with the software configuration model. Web processing components of the ESS should be run on the operational Web server machine.

EXECUTABLE FILES

For automatic processing, install the main ESS executable *evsc_drv* in the `/cmss/rel/bin/` directory, accessible by the ESS host machine and the Perl script *go_evsc* in the `/cmss/scripts/bin/` directory. In addition, install the ESS library file *libevsc.a* in the `/cmss/rel/lib/` directory to support automatic processing and event-screening requests via the Message Subsystem.

Install the scripts and executables for ESS Web processing in the `$EVSC_WEB/bin/` and `$EVSC_WEB/evsc_bin/` directories, accessible by the operational Web server machine. Refer to Table 6 on page 26 and Table 7 on page 27 for a list of the scripts and executables.

CONFIGURATION DATA FILES

The files process.par and shared.par in /cmss/config/system_specs/ contain IDC-specific paths and aliases. The file global.shenv in /cmss/config/system_specs/env/ also contains global environment variables. These files contain global variables for all operational software. ESS parameters described in this section are set by operations staff and are not intended to be modified by general users.

evsc.par

The file evsc.par in /cmss/config/app_config/automatic/EVSC/ contains environment variables specific to the ESS for all processing modes. An example of this par file follows. Modify the parameters in this par file for the IDC environment.

```
# Par for evsc_drv
# Database high level pars
par=$(IMSPAR)
par=$(AUTOMATIC)
database=$(IDCXDB)
database_dev=$(EXPERTDB)
# Data file pathnames
blockdata_path="$(STATICDIR)/BLK_OSO"
bayesdata_path="$(EVSC_DIR)/BAYES"
topexdata_path="$(EVSC_DIR)/maps/topo_6.2.img"
# Database table names
evsc_prod_tablename=idcx.evsc_prod
evsc_hydro_tablename=idcx.evsc_hydro
evsc_regional_tablename=idcx.evsc_regional
dataready=idcx.dataready
lastid=idcx.lastid
producttypeevsc=idcx.producttypeevsc
producttypeorigin=idcx.producttypeorigin
regcoef=idcx.regcoef
attencoef=idcx.attencoef
origin=reb.origin
origerr=reb.origerr
netmag=reb.netmag
assoc=reb.assoc
```

```
arrival=reb.arrival
parrival=reb.parrival
amplitude=reb.amplitude
hydro_features=idcx.hydro_features
affiliation=static.affiliation
site=static.site
attencoef=idcx.attencoef
regcoef=idcx.regcoef
# Misc
mode=db_write
debug=2
wfunc=screen2
#hydro params:
hydro_net_name=('PSUR','WK30','WK31''DGN01','DGN02','DGN03',\
   'DGS04','DGS05','DGS06')
hydro_noi7_ave="PSUR:82.116 WK30:97.5998 WK31:66.2562\
   DGN01:89.402 DGN02:88.438 DGN03:88.820 DGS04:92.395\
   DGS05:92.067 DGS06:92.315"
hydro_noi7_sigma="PSUR:13.935 WK30:1.1542 WK31:1.0735\
   DGN01:1.891 DGN02:1.830 DGN03:1.750 DGS04:1.491 \
   DGS05:1.376 DGS06:1.242"
#regional analysis params:
reg_net=('ALL')
reg_attenid="'T/S:D3-17SN2.0/1.2'"
reg_rcoefid="'Bayes68'"
reg_rscore_method=average
reg_min_psnr=2.0
reg_min_ssnr=1.3
#network names and paths for station capability metrics:
metric_net_primary=('CUR_PRI')
metric_net_auxiliary=('CUR_AUX')
metric_net_hydroacoustic=('CUR_HYD')
metric_net_infrasound=('CUR_INF')
stationstatus_path_primary="$(REPORTDIR)/daily/primary"
stationstatus_path_auxiliary="$(REPORTDIR)/daily/primary"
stationstatus_path_hydroacoustic="$(REPORTDIR)/daily/primary"
stationstatus_path_infrasound="$(REPORTDIR)/daily/primary"
stationstatus_fnfmt_primary="%Y_%m%d"
stationstatus_fnfmt_auxiliary="%Y_%m%d"
stationstatus_fnfmt_hydroacoustic="%Y_%m%d"
stationstatus_fnfmt_infrasound="%Y_%m%d"
```

env.pl

The file $EVSC_WEB/evsc_bin/env.pl contains configuration parameters specific to the ESS Web processing mode. Modify the parameters for the IDC environment. An example of the env.pl file follows:

```
#!/cmss/local/bin/perl
# @(#)env.pl 07/01/01
# some global requires (needed by stacap):
require "/web/web-content/web-bin/stacap/bulllib.pl";
require "/web/web-content/web-bin/stacap/weblib.pl";
require "/web/web-content/web-bin/stacap/cgi-lib.pl";
require "/web/web-content/web-evsc/evsc_bin/station_markers.pl";
sub env{
$development = 0;
$ENV{development} = $development;
$data_center = 1;
umask 007;
$DEBUG = "OFF";
$db_limit  = 20; #set the database load limit
$exceed_sec = (951091200.000); #Upper limit on dates (2000/02/
21) in seconds.
                                #No check is done if $exceed_sec < 0.
#These are needed in case of an automated run...
if ($ENV{HTTP_HOST} eq "") {
  #non-web run - do nothing
  ;
}
else {
  #This is a web run...
  #These 2 statements ensure stderr goes to logfile instead of stdout...
  #This was a problem with the Netscape Enterprise Server.
  close(STDERR);
  open(STDERR,">>/web/suitespot/https-webster/logs/errors");
}
$mach_subdir = "EvCut";
$ENV{MSEAS} = "/web/web-content/web-evsc";
$ENV{TREE_TOP} = "/web/web-content";
$ENV{HEADER} = "$ENV{TREE_TOP}/web-idc";
$ENV{MSEASDATA} = $ENV{MSEAS} . "/data";
$ENV{MSEASTMP} = $ENV{MSEAS} . "/tmp";

$earth2    = "$ENV{TREE_TOP}/web-bin/earth2";
```

```
$topo_file = "$ENV{TREE_TOP}/web-bin/data/etopo05.dat";
$evsc_parfile = "$ENV{MSEASDATA}/db.par.3.0"; #location of evsc par file

$server = $ENV{SERVER_NAME};
$loc = "/" ;

if($development){
  $ENV{MSEASBIN} = $ENV{MSEAS} . "/bin_dev";
  $ENV{RUNS} = "runs_proto";
  $ENV{CGI} = "evsc_bin_dev";
}
else {
  $ENV{MSEASBIN} = $ENV{MSEAS} . "/bin";
  $ENV{RUNS} = "runs";
  $ENV{CGI} = "evsc_bin";
}

$ENV{CGIBIN} = $ENV{MSEAS} . "/" . $ENV{CGI};
$ENV{RUNDIR} = $ENV{MSEAS} . "/" . $ENV{RUNS};

#stacap settings:
#RN link for Exec Summ map
$rn_link_map = "web-gards/web-bin/web_cgi_wrapper.pl/web_armr_gen";
#RN link for Exec Summ table
$rn_link_table = "web-gards/web-bin/rnps/rnps.pl";
$stacapmap_loc = "/web/web-content/web-bin/stacap/stacapmap";
$stationstatus_loc = "/web/web-content/web-gsett3/StationStatus";
$hydrostatus_loc = "/web/web-content/web-gsett3/HydroStatus";
$infrastatus_loc = "/web/web-content/web-gsett3/InfraStatus";
$auxstatus_loc = "/web/web-content/web-gsett3/AuxStatus";
$debug_loc = "/web/suitespot/https-webster/logs/errors";
$web_bin_loc = "/web/web-content/web-bin";
$stationinfo_ref = "web-bin/stationinfo";
$stacaphist_ref = "web-bin/stacap/stacaphist";
$stacapmap_ref = "web-bin/stacap/stacapmap";
$bullmap2_ref = "/web-bin/stacap/bullmap2";
$body_header_file = "/web/web-content/web-idc/Header.shtml";
$body_footer_file = "/web/web-content/web-idc/Footer.shtml";
#stacap names for vars already defined:
$EARTH2 =      "$earth2";
$EVCH_DIR =    "$ENV{MSEAS}";
$WEB_DIR =     "$ENV{MSEAS}";
$ETOPO =       "$topo_file";
```

```
#pl4 params:
$ENV{PL4DIR} = "$ENV{MSEAS}/pl4" ;
$ENV{LD_LIBRARY_PATH} .= ":/usr/openwin/lib";

#database settings:
# Note that these database settings apply to the web scripts only.
# The par file located in the ../data directory defines the database
# parameters for the event screening code and must be set
# consistently with the items below.

# database name and account of reb data
  $database     = "xxx/xxx@xxx";
  $database_pre = "reb";

# database name and account of subscription data
  $database_dev = "xxx/xxx@xxx";
  $database_dev_pre = "idcx";
  $default_tagid2 = 27;  #prodid of default subscription

# database name of radionuclide data
  $rn_database = "rmsuser/xxx@xxx";

  $ENV{ORACLE_HOME} = "/home/oracle";
  $ENV{ORACLE_TERM} = "vt100";
  $ENV{ORACLE_SID}  = "oracle";
  $ENV{TNS_ADMIN}  = "/home/oracle/network/admin";
  $ENV{GDIHOME} = "/cmss/rel";
  $ENV{GDI_HOME} = $ENV{GDIHOME};
  $ENV{LD_LIBRARY_PATH} .= ":$ENV{ORACLE_HOME}/lib";

# These env's are kept around for compatibility -
# These don't need to be set, they are set based on data from above.
  $sql_prefix = "$database_pre";
  $sql_prefix_originamp = "$database_pre";
  $ora_logon   = "$database";
  $ENV{database_subs} = "$database_dev";
  $ENV{subs_prefix} = "$database_dev_pre";
  $ENV{ora_logon_subs} = $ENV{database_subs};
  $CGI = $ENV{CGI};
  $|=1; #Forces flush on print buffers
}
1;
```

DATABASE

This section describes database elements, including accounts and tables, required for operation of the ESS.

Accounts

The ESS requires access to both the operations and archive databases, typically through the primary pipeline and REB accounts (IDCX, REB). The ESS also queries other accounts (such as STATIC) to retrieve network and station information. The tables in these accounts must be readable by the ESS. In addition, the ESS must be able to write to the **evsc_prod**, **evsc_hydro**, **evsc_regional**, **lastid**, and **dataready** tables, which are typically in the IDCX account.

Tables

Database tables required by the ESS are listed in Table 18 on page 34 and are documented in [IDC5.1.1Rev2]. Figure 13 shows the entity relationships between the major tables used by the ESS. The **evsc_prod**, **evsc_hydro**, **evsc_regional**, **attencoef**, **regcoef**, and **producttypeevsc** tables are specific to the ESS. Brief descriptions of these tables and SQL*Plus scripts to create them follow.

The **evsc_prod** table contains event-screening results for the standard and subscription criteria. The table contains one record per *orid* for each subscription (*prodid*). Run the script *evsc_prod_cre.sql* to create this database table.

The **evsc_hydro** table contains station-specific hydroacoustic event-screening results for the standard and subscription criteria. The table contains one record per *orid* per *sta*. Run the script *evsc_hydro_cre.sql* to create this database table.

The **evsc_regional** table contains station-specific regional seismic phase amplitude measurements, their corrected values, uncertainties, and data quality flags for the standard and subscription event-screening criteria. The table contains one record per *orid* per *sta*. Run the script *evsc_regional_cre.sql* to create this database table.

The **producttypeevsc** table contains the input parameters that define the event-screening criteria for the standard case and national subscriptions. It is used in conjunction with the **producttypeorigin** table to specify the set of user input criteria. The table contains one record for each subscription (*prodid*). Run the script *producttypeevsc_cre.sql* to create this database table.

The **attencoef** table contains station-specific attenuation coefficients to distance-correct regional P/S amplitude ratios. This table is static and contains one row per *sta* per *ratiotype* per *chan* for each *attenid*. Run the script *attencoef_cre.sql* to create this database table.

The **regcoef** table contains coefficients used by the regional P/S event-screening analysis algorithm. This table is static and contains one row per *rcoeftype* for each *rcoefid*. Run the script *regcoef_cre.sql* to create this database table.

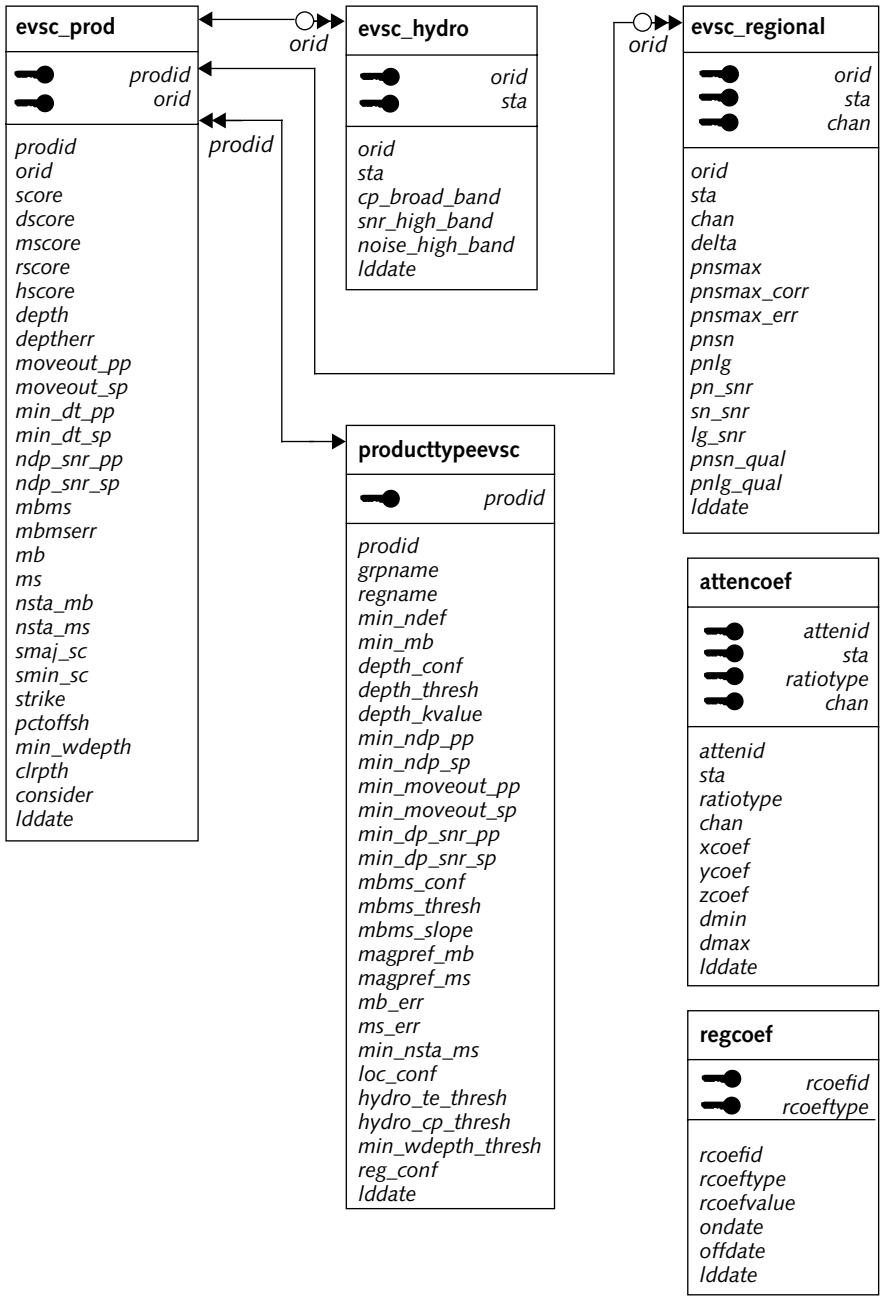


FIGURE 13. ENTITY RELATIONSHIPS OF EVENT SCREENING SUBSYSTEM TABLES

TUXEDO FILES

The file that controls ESS automatic processing under Tuxedo is `/cmss/config/system_specs/ubb_process.resolved`. Modify this file appropriately for the IDC environment. The `ubb_process.resolved` file contains the following lines required for the ESS:

```
-- Main nd backup Tuxedo shells to run evsc

tuxshell SRVGRP=EVCH_PRI SRVID=860 CLOPT="-s evscreen:tuxshell -o \
/dev/null -e /dev/null -- \
par=/cmss/config/app_config/distributed/tuxshell/evch/tuxshell-\
evscreen.par"

tuxshell SRVGRP=EVCH_BAK SRVID=10860 CLOPT="-s evscreen:tuxshell -o \
/dev/null -e /dev/null -- \
par=/cmss/config/app_config/distributed/tuxshell/evch/tuxshell-\
evscreen.par"

-- Processes to queue evsc intervals for processing (main and backups)

tis_server SRVGRP=FLOW_PRI SRVID=1080 CLOPT="-s tis-evsc:tis -o \
/dev/null -e /dev/null -- \
par=/cmss/config/app_config/distributed/tis/tis-evsc.par"

tis_server SRVGRP=FLOW_BAK SRVID=11080 CLOPT="-s tis-evsc:tis -o \
/dev/null -e /dev/null -- \
par=/cmss/config/app_config/distributed/tis/tis-evsc.par"

-- Message forwarding service for evsc

TMQFORWARD SRVGRP=QM_PRI SRVID=5860 CLOPT="-- -i 10 -q evscreen \
-t 3700"

TMQFORWARD SRVGRP=QM_BAK SRVID=15860 CLOPT="-- -i 10 -q evscreen \
-t 3700"

-- Loads assigned to the main and backup tuxedo processes to run evsc

evscreen LOAD=10 SRVGRP=EVCH_PRI

"tis-evsc" LOAD=10 SRVGRP=FLOW_PRI

evscreen LOAD=20000 SRVGRP=EVCH_BAK

"tis-evsc" LOAD=20000 SRVGRP=FLOW_BAK
```

INITIATING OPERATIONS

The ESS is ready for execution after the appropriate directories are created, the executables are installed, the new accounts are established, the new database accounts are created and populated with the required tables, the **lastid** table is initialized, and the parameters in the parfiles are modified for the new environment. Refer to "Software Startup" on page 40 for instructions on starting the ESS.

VALIDATING INSTALLATION

Validate the installation of the ESS by running test cases, as described in the sections that follow. For purposes of illustration, 4 March, 2001 and *evid* = (`21162165, 21157474`) are used as test data for the following cases. These data are appropriate because seismic, hydroacoustic, and regional data are all present. At the IDC, a different date and *evid* set may be more appropriate. If errors occur, refer to "Chapter 3: Troubleshooting" on page 55.

Automatic Processing Mode

To validate the automatic processing mode of the ESS, run a test case from the UNIX command line, as follows:

1. Using *csh*, run the *go_evsc* script with start and stop times for a date known to include seismic and hydroacoustic data. For example, type the following command (where `$evsc_scripts`, `$evsc_bin`, and `$evsc_par` represent the installed locations of the *go_evsc* script, the *evsc_drv* executable, and the `evsc.par` parfile, respectively):

```
$evsc_scripts/go_evsc start_time=983664000.000 \
  end_time=983750400.000 \
  evsc_screen_par=$evsc_par/evsc.par \
  event_screen_binary=$evsc_bin/evsc_drv debug=2 \
  >& logfile
```

   The events in the REB on March 4, 2001 are processed, and the appropriate rows are written to the **dataready**, **evsc_prod**, **evsc_hydro**, and **evsc_regional** tables.

2. Using the following SQL*Plus query, check the **dataready** table for rows containing *tagid* = `2001063` and *tablename* = `evchar`.

```
select * from dataready
where tagid=2001063 and tablename='evchar';
```

   There should be one row per unique *prodid* as defined in the **producttypeevsc** table.

3. Check the **evsc_prod** table for entries with *prodids* in the **producttypeevsc** table and *orids* occurring on 4 March, 2001. Each row in the **producttypeevsc** table has corresponding results in the **evsc_prod** table.
4. Check the **evsc_hydro** and **evsc_regional** tables. These tables should have entries for *orid*s with appropriate data occurring on 4 March, 2001.
5. Screening results are written to the log file in the form of debug output, followed by an Executive Summary, followed by screening output SEB lines. Use these log entries to compare results from this run to the test of the Web processing mode, described in the Web Processing Mode section.
6. If the rows are not written to the output tables, check the debug output in the log file for information indicating the cause.

Web Processing Mode

To validate the Web processing mode of ESS, run a test case, as follows:

1. Using a Netscape browser (version 4.0 or higher), access the Custom Event Screening Form page via the "National Screening" link of the "Services" submenu on the left-hand frame of the Products page.
2. Fill in the time fields of the Custom Event Screening Form to `2001/03/04` and `2001/03/05`.
3. Click the "Submit Run" button. An Executive Summary page should be generated and displayed.

4. Compare the results in the summary table with the log file output of the automatic processing test described in "Automatic Processing Mode" on page 77; they should agree (click the "Total Worldwide" link in the summary table to show results for the events).
5. If the results do not match as expected, check the debug output in the log file for information indicating the cause.

AutoDRM Request Mode

To validate the *AutoDRM/GSEBull* mode of execution, run test cases from the UNIX command line. In the procedures below, the commands are defined as follows:

`$gsebull_loc` = location of latest *GSEBull* executable
`$database` = name of database containing input table data
`$account` = account containing input table data
`$gse_par` = parfile containing ESS and Message Subsystem parameters

1. As a first example, run the *GSEBull* executable for *evid* = `21162165`:

```
$gsebull_loc event_id_list=21162165 \
  database=$database account=$account \
  data_type=BULLETIN evch-compute subformat=LONG \
  par=$gse_par
```

This produces an SEB for *evid* = `21162165`. The EVENT SCREENING block contains the following results:

```
EVENT SCREENING

Category  Score Dscore Mscore Rscore Hscore Smaj_sc Smin_sc
Depth  Sdep  mbms Smbms       Foffsh MinWD Clr

NS/Offsh  -1.50                    -1.50    60.5    23.1
                                1.00  1918   y

Hydroacoustic Data
sta      cps8   snr7   noi7
DGN01          24.77  87.13
DGN02          24.98  87.52
DGN03          24.60  87.97
DGS04          21.38  92.34
```

```
DGS05          21.41  92.00
DGS06          20.57  92.44
```

2. As a second example, run the *GSEBull* executable for *evid* = `21157474`:

```
$gsebull_loc event_id_list=21157474 \
  database=$database account=$account \
  data_type=BULLETIN evch-compute subformat=LONG \
  par=$gse_par
```

This produces an SEB for *evid* = `21157474`. The EVENT SCREENING block contains the following results:

```
EVENT SCREENING

Category  Score Dscore Mscore Rscore Hscore Smaj_sc Smin_sc
Depth  Sdep  mbms Smbms       Foffsh MinWD Clr

SO/Offsh   0.33  -0.27          0.33           57.1    23.5
 86.4 104.1                     1.00  2778   n

Regional Data
sta    pnsmax   corr    err
ASAR     0.20   0.02   0.01
FITZ     0.03  -0.13   0.01
WRA     -0.32  -0.11   0.00
```

3. If the EVENT SCREENING blocks are not produced properly, check the log file for information indicating the cause. Refer to "Chapter 3: Troubleshooting" on page 55 for descriptions of common errors and their solutions.

References

The following sources supplement or are referenced in the document:

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[IDC3.4.1Rev2] Science Applications International Corporation, Veridian Pacific-Sierra Research, *Formats and Protocols for Messages*, Revision 2, SAIC-00/3005, PSR-00/TN2829, 2000.

[IDC5.1.1Rev2] Science Applications International Corporation, Pacific-Sierra Research Corporation, *Database Schema*, Revision 2, SAIC-00/3057, PSR-00/TN2830, 2000.

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[IDC6.5.19] Science Applications International Corporation, *Message Subsystem Software User Manual*, SAIC-00/3001, 2000.

[IDC7.1.1] Science Applications International Corporation, *Detection and Feature Extraction (DFX)–Scheme Files*, SAIC-01/3000, 2001.

[IDC7.4.2] Science Applications International Corporation, Pacific-Sierra Research, Inc., *Message Subsystem*, SAIC-98/3003, 1998.

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[Smi97] Smith, W. H. F., and Sandwell, D. T., "Global Sea Floor Topography from Satellite Altimetry and Ship Depth Soundings," *Science*, Volume 277, pp. 1956–1962, 1997.

[WGB01] Working Group B, *Report of the IDC Technical Experts Meeting on Seismic–Acoustic Event Screening,* Preparatory Commission of the Comprehensive Nuclear Test-Ban Treaty Organization, CTBT/WGB-TL-2/58, 2001.

Glossary

A

amplitude

Zero-to-peak height of a waveform in nanometers.

AutoDRM

Automatic Data Request Manager.

B

bulletin

Chronological listing of event origins spanning an interval of time. Often, the specification of each origin or event is accompanied by the event's arrivals and sometimes with the event's waveforms.

C

cepstrum (cepstral)

Fourier transformation of a power spectrum whose magnitudes have been scaled logarithmically.

CGI

See Common Gateway Interface.

commercial-off-the-shelf

Terminology that designates products such as hardware or software that can be acquired from existing inventory and used without modification.

Common Gateway Interface

A specification for transferring information between a World Wide Web server and a CGI program. A CGI program is any program designed to accept and return data that conforms to the CGI specification.

computer software component

Functionally or logically distinct part of a computer software configuration item; possibly an aggregate of two or more software units.

computer software configuration item

Aggregation of software that is designated for configuration management and treated as a single entity in the configuration management process.

COTS

See commercial-off-the-shelf.

CSC

See computer software component.

CSCI

See computer software configuration item.

D

DACS

See Distributed Application Control System.

dB

Decibel.

DBA

Database Administrator.

Distributed Application Control System

This software supports inter-application message passing and process management.

E

email

Electronic mail.

event characterization

IDC process of characterizing events by features of signals recorded at one or more stations.

event screening

IDC process of assessing whether an event is consistent with natural or man-made, non-nuclear phenomena.

Executive Summary

Product that provides summary statistics regarding the number of S/H/I events formed by automated and reviewed processing, the numbers of those events in the various event-screening categories, the number of Level 4 and 5 radionuclide events, the status of IMS stations, the status of communications, and IDC systems status.

G

GB

See gigabyte.

GDI

Generic Database Interface.

GIF

See Graphics Interchange Format.

gigabyte

Measure of computer memory or disk space that is equal to 1,024 megabytes.

Graphics Interchange Format

Bit-mapped graphics file format used by the World Wide Web that supports color, various resolutions, and data compression.

H

hydroacoustic

Pertaining to sound in the ocean.

Hz

Hertz.

I

IDC

International Data Centre.

IMS

International Monitoring System.

insufficient data

Category of S/H/I events that lack adequate measurements to apply any of the event-screening criteria.

IPC

Interprocess communication. The messaging system by which applications communicate with each other through *libipc* common library functions. See *tuxshell*.

K

km

Kilometer.

L

long term average

Running average of the absolute value or squared value of a waveform. The averaging window is long compared to the short-term averaging window.

LTA (or LTAV)

See long term average.

M

m

(1) Meter(s).

MB

See megabyte.

m_b

Magnitude estimated from seismic body waves.

megabyte

1,024 kilobytes.

moveout

Time difference between the same arrivals (such as P) at different stations or between different arrivals at the same stations (like P and pP), also known as stepout.

mPa

milliPascals.

M_s

Magnitude of seismic surface waves.

N

National Event Bulletin

Bulletin of events that is a national product involving application of national event-screening criteria.

National Executive Summary

A version of the Executive Summary that uses national event screening criteria.

National Screened Event Bulletin

Bulletin of events that is a national product, excluding events that were screened out by national event-screening criteria.

NEB

See National Event Bulletin.

NES

See National Executive Summary.

network

Spatially distributed collection of seismic, hydroacoustic, or infrasonic stations for which the station spacing is much larger than a wavelength.

Network File System

(Sun Microsystems) Protocol that enables clients to mount remote directories onto their own local filesystems.

NFS

See Network File System.

noise

Incoherent natural or artificial perturbations of the waveform trace caused by ice, animals migrations, cultural activity, equipment malfunctions or interruption of satellite communication, or ambient background movements.

not considered

Category of S/H/I events that are not considered for application of the event-screening procedure.

not screened out

Category of S/H/I events that have sufficient data to apply at least one event-screening criterion but do not satisfy any of the criteria.

NSEB

See National Screened Event Bulletin.

O

ORACLE

Vendor of the database management system used at the PIDC and IDC.

orid

Origin Identifier.

origin

Hypothesized time and location of a seismic, hydroacoustic, or infrasonic event. An event may have many origins. Characteristics such as magnitudes and error estimates may be associated with an origin.

P

P phase

Seismic wave that travels from the event to the station as a compressional wave through the solid earth.

Pa

Pascals.

R

REB

See Reviewed Event Bulletin.

regional

(1) (distance) Source-to-seismometer separations between a few degrees and 20 degrees. (2) (event) Recorded at distances where the first P and S waves from shallow events have traveled along paths through the uppermost mantle.

Reviewed Event Bulletin

Bulletin formed of all S/H/I events that have passed analyst inspection and quality assurance review.

S

score

Numerical indication of the degree to which an event does, or does not, meet the event-screening criteria.

screened out

Category of S/H/I events that are considered to be consistent with natural or man-made, non-nuclear phenomena.

script

Small executable program, written with UNIX and other related commands, that does not need to be compiled.

SEB

See Standard Event Bulletin.

seismic

Pertaining to elastic waves traveling through the earth.

short-term average

Running average of the absolute value or squared value of a waveform. The averaging window is short in duration compared to the LTA.

Solaris

Name of the operating system used on Sun Microsystems hardware.

SQL

Structured Query Language; a language for manipulating data in a relational database.

SSEB

See Standard Screened Event Bulletin.

STA (or STAV)

See short-term average.

Standard Event Bulletin

List of analyst reviewed S/H/I events and event parameters (origin and associated arrival information). The SEB is similar to the REB, but also includes event characterization parameters and event screening results for each event.

Standard Screened Event Bulletin

Similar in content and format to the Standard Event Bulletin (SEB), but excludes events that were screened out by the standard event-screening criteria.

station

Collection of one or more monitoring instruments. Stations can have either one sensor location (for example, BGCA) or a spatially distributed array of sensors (for example, ASAR).

subsystem

Secondary or subordinate system within the larger system.

T

Tuxedo

Transactions for UNIX Extended for Distributed Operations.

tuxshell

Process in the Distributed Processing CSCI used to execute and manage applications. See IPC.

U

UNIX

Trade name of the operating system used by the Sun workstations.

URL

Uniform Resource Locator.

W

Web

World Wide Web; a graphics-intensive environment running on top of the Internet.

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